National Pollutant Discharge Elimination System

FACT SHEET for

BP Products North America Inc.

January 22, 2013

Indiana Department of Environmental Management

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Indianapolis, Indiana 46204
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www.idem.IN.gov

Permittee:	BP Products North America Inc. Whiting Refinery 2815 Indianapolis, Blvd. Whiting, Indiana
Existing Permit Information:	Permit Number: IN0000108 Expiration Date: 7/31/2012
Source Contact:	Ms. Rose Herrera 219/473-3393
Source Location:	BP Products North America Inc. Whiting Refinery 2815 Indianapolis, Blvd. Whiting, Indiana 46394 Lake County
Receiving Waters:	Lake Michigan and the Lake George Branch of the Indiana Harbor Ship Canal
Proposed Action:	Renew of the NPDES Permit that expired on July 31, 2012 Date Application Received: February 6, 2012
Source Category	NPDES Major – Industrial
Permit Writer:	Mr. Steve Roush 317/233-5747 or sroush@idem.in.gov

Table of Contents

1.0 INTRODUCTION

The Indiana Department of Environmental Management (IDEM) received a National Pollutant Discharge Elimination System (NPDES) Permit application from BP Products North America, Whiting Business Unit on February 6, 2012 to renew their NPDES permit No. IN0000108. This permit regulates the discharge of process wastewater, storm water and non-contact cooling water from Outfalls 002 and 005 at the Whiting, Indiana facility to Lake Michigan and the discharge of storm water through Outfalls 003 and 004 into the Lake George Branch of the Indiana Harbor Ship Canal.

A five (5) year permit is proposed in accordance with 327 IAC 5-2-6(a).

In accordance with Title 40 of the Code of Federal Regulations (CFR) Sections 124.8 and 124.6, as well is Indiana Administrative Code (IAC) 327 Section 5, development of a Fact Sheet is required for NPDES permits. This document fulfills the requirements established in those regulations.

This Fact Sheet was prepared to document the factors considered in the development of NPDES Permit effluent limitations. The technical basis for the Fact Sheet may consist of evaluations of promulgated effluent guidelines, existing effluent quality, receiving water conditions, and wasteload allocations to meet Indiana Water Quality Standards. Decisions to award variances to Water Quality Standards or promulgated effluent guidelines are justified in the Fact Sheet where necessary.

2.0 FACILITY DESCRIPTION

2.1 General

BP Products North America Inc. owns and operates a petroleum refinery located on approximately 1,400 acres within the boundaries of Whiting, East Chicago, and Hammond, Indiana, near the southern tip of Lake Michigan. The refinery employs approximately 1,850 people and produces a variety of petroleum products, including gasoline of all grades, diesel fuel, heating fuel, jet fuel, asphalt, and petroleum coke. The refinery also produces petroleum intermediates.

BP Whiting discharges three types of wastewater: treated effluent; once-through non- contact cooling water; and storm water. First, the refinery discharges, as a long-term average, 15.7 million gallons per day (MGD) of treated effluent through Outfall 005 into Lake Michigan. The maximum monthly average is 19.9 MGD. The treated effluent originates from water used in or received by the plant, recovered groundwater, and most of the storm water from the site, all of which is treated in the refinery's wastewater treatment plant (WWTP) and discharged via a high rate multiport diffuser. Second, the refinery discharges, as a long-term average, 73.7 MGD of once-through non-contact cooling water through Outfall 002, also into Lake Michigan. Third, the refinery intermittently discharges the balance of its storm water through Outfalls 003 and 004 into the Lake George Branch of the Indiana Harbor Ship Canal.

During the term of the renewed permit, BP will continue the Whiting Refinery Modernization Project (WRMP), known (in part) in the existing permit as the Canadian Ex1ra Heavy Crude Oil

(CXHO) project. Construction is currently underway and is anticipated for completion around the end of 2013.

OTHER PERMIT RENEWAL ITEMS

1. On August 23, 2007, BP Whiting committed to operating the Whiting refinery in compliance with the TSS and ammonia limitations contained in its 1990 NPDES permit, notwithstanding the revised limitations contained in the current permit, which were properly calculated under the effluent limitations guidelines set forth in 40 CFR 419.22(a), 419.23(a), and 419.24(a), and approved by IDEM in accordance with applicable antidegradation requirements. BP since has invested millions of dollars toward continued research and engineering to further reduce the levels of pollutants discharged from the facility, and remains committed to keeping TSS and ammonia loadings at or below the 1990 authorized levels. As a result, BP requests that IDEM revise the current TSS and ammonia loading limitations to reflect the values established in the 1990 permit.

2. BP Whiting requests the continuation of the Clean Water Act Section 316(a) variance as documented in Part III.A of the existing permit. Phase I of the Thermal Plume Study was completed on March 4, 2011. The Phase II Thermal Variance Study Plan was approved by IDEM July 8, 2011. IDEM received the application from BP on July 24, 2012 for renewal of the existing alternate thermal effluent limits.

3. BP Whiting requests that the zebra mussel control program in place be continued. This program has been revised to incorporate year-round chlorination to control zebra as well as Quagga mussels as described in the supplemental information at the end of this application.

4. BP Whiting requests the continuation of the alternate mixing zone for the Outfall 005 high rate multiport diffuser, including the application of a 37.1:1 mixing ratio for water quality based effluent limit (WQBEL) development. Per part I.H.1 of the existing permit, BP submitted the diffuser operation and maintenance plan to IDEM (current revision = 8/22/2011).

5. BP requests continuation of the 316(b) study approval given in Part III.B and Part I.F.4 of the existing permit.

6. BP requests that IDEM update descriptions to account for existing sources of offsite wastewater. Examples are Whiting Clean Energy, Praxair, Ineos, and Griffith LPG Cavern storage dewatering. In addition, all on site remediation groundwater is sent to the wastewater treatment facility. Further, consistent with 40 CFR 437.1 (b)(2)(b), offsite facilities (both BP and non-BP owned) such as pipelines and terminals may produce other wastewater from activities including tank inspections, hydro testing of equipment, dewatering operations, equipment clean out from maintenance and turnaround activities, dewatering of equipment, and other wastewater, which may be sent to the BP wastewater treatment plant for oil recovery and wastewater treatment.

7. BP does not manufacture pesticides on site. However, pesticides are occasionally applied to refinery areas by a qualified contractor in accordance with FIFRA regulations. Outfall 005 effluent sampling resulted in no detections of pesticide constituents required in USEPA Form 2C.

8. BP requests the continued application of a Streamlined Mercury Variance (SMV) in the renewed permit in accordance with the SMV application submitted to IDEM on 11/20/2010. The resulting draft permit modification to incorporate a SMV went to public notice on Nov 14, 2011. An update of the SMV effluent mercury database is provided in Table ES-1 of this application. These data are presented in lieu of mercury results reported in Form 2C Section V.C for Outfall 005.

9. BP is currently engaged in a 5-year compliance schedule for vanadium effluent limitations at Outfall 005 per Part I.E.2 of the existing permit. For the renewed permit, BP requests that IDEM incorporate the most recent available updated vanadium data to revise Tier II water quality criteria.

10. BP requests the biological survey frequency given in Part I.H.2 of the existing permit be reduced from annually to the first, third, and fifth year of the renewed permit. The frequency may be increased if findings suggest significant changes in monitored biological/chemical characteristics. Annual biological surveys were conducted under the terms of the existing permit in July 2009 (pre-diffuser), August 2010 (post-diffuser), and July 2011. The data have shown that there have been no significant changes (relative to historic lake conditions) to the biotic community from year to year. The reduced monitoring frequency will be sufficient to identify trends in biological community structure and composition in future years.

11. BP requests that Outfall 005 sampling type for sulfide be revised to "grab" instead of the current "composite" requirement, such that preservation of the sample can be done in accordance with 40 CFR 136 Table E.

12. BP requests clarification on the definition of the monitoring frequency of "weekly" in Part I.A for the renewed permit. BP requests this interpretation be a working week of 7 days for Outfalls 005/002. For Outfalls 003/004 BP defines Monday through Sunday as the work week and Monday as the first day of the week.

13. BP requests that, in the renewed permit, IDEM change the language in the Outfall 003 and Outfall 004 descriptions from "non-process stormwater" to "stormwater associated with industrial activity"; from ,the J&L, Lake George, and tank dike ,areas of 'the refinery to maintain consistency with 40 CFR 122.26(b)(14);definition.

14. BP requests that: the description of authorized wastewater -sources to Outfall 005- be revised to acknowledge that the WWTP receives and-treats-wastewater from normal refinery operations including maintenance, turnaround activities, excavation, dewatering, construction activities, tank cleaning, and temporary flows from upsets or downtime. Such temporary flows would include, as necessary, the retreatment of off-spec WWTP effluent that has been temporarily stored in alternate storage locations via the firewater recycle system rather than discharged to Lake Michigan. The temporarily stored off-spec WWTP effluent would then be rerouted back through the WWTP for additional treatment and final discharge. In addition, it should be noted that the process sewers are part of the wastewater collection system.

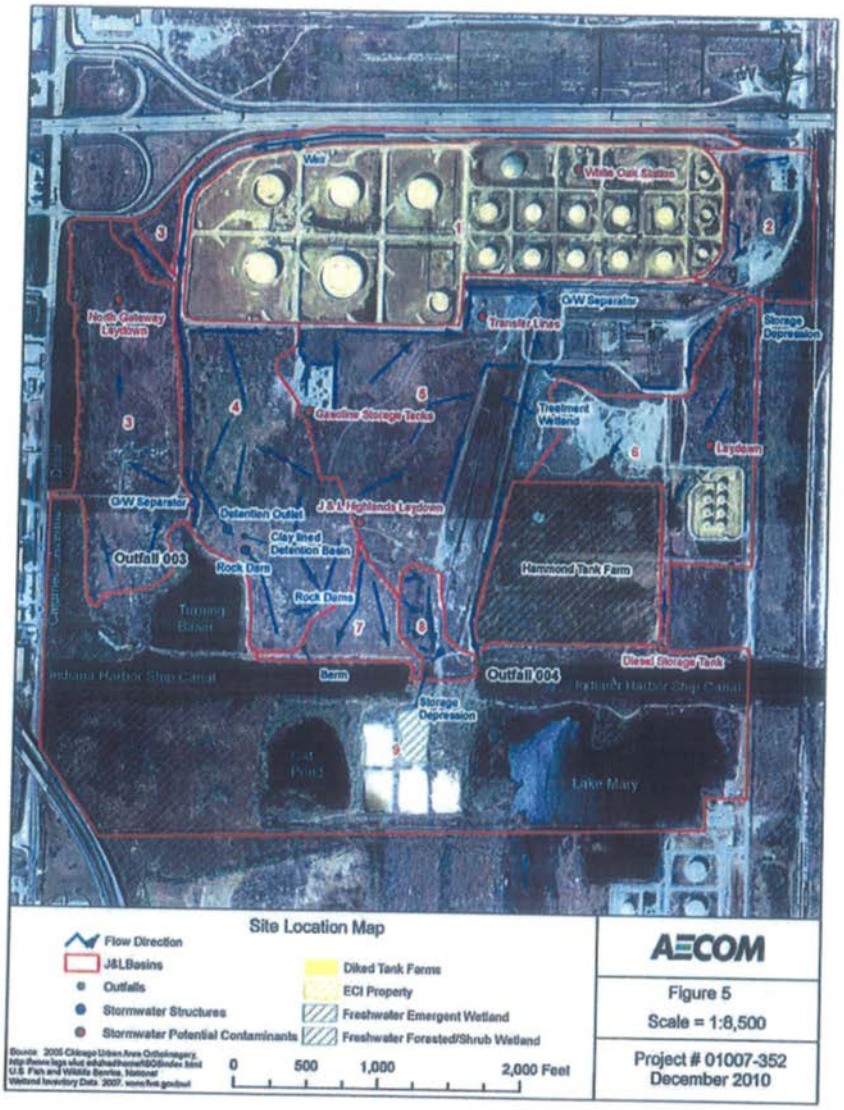
BP Products North America, LLC is classified under Standard Industrial Classification (SIC) Code 2911 Petroleum Refinery. The facility manufactures a variety of petroleum products, including gasoline of all grades, diesel fuel, heating fuel, jet fuel, asphalt, and petroleum coke. The refinery also produces petroleum intermediates.

A map showing the location of Outfalls 002 and 005 has been included as Figure 1.

Figure 1: Wastewater Treatment Facility Location

Figure 2: Storm Water Associated with Industrial Activity (Outfalls 003 and 004)

CHMENT 9A J & L Storm Water Map



Current Discharge to Outfalls 003 and 004 - J&L and Lake George Area

This section describes the area currently contributing to Outfalls 003 and 004, referred to as the J&L and Lake George Area.

The J&L and Lake George Area is located almost entirely in the city of Hammond, with a small portion in the northwest corner located in East Chicago, Indiana. The property is bordered on the north by 129th Street, the Indiana Harbor Ship Canal (south), Calumet Avenue (west), and B&O Railroad right of way (east). Contributing drainage areas include the Lake George Tank Field (59.0 acres), the rest of Lake George outside the tank field (66.6 acres), the J&L Tank Field (90.9 acres), and the rest of J&L outside the tank field (230.8 acres). Whiting Business Unit document E2001 is the Whiting Industrial Storm Water Pollution Prevention Plan (SWPPP) applicable to the J&L Area. The SWPPP identifies potential sources of pollution, describes practices and measures for reducing pollution potential, and assures compliance with the permit.

Land Cover

Approximately 15% of the J&L and Lake George Area consist of impervious refinery structures such as piping and tanks, trailers, and roadways. Natural vegetation occurs in a large section of the J&L and Lake George Area and intermittent landscaped vegetation exists around streets and some buildings. As a result, most of the drainage area routed to Outfalls 003 and 004 is vegetated.

Stormwater Drainage and Outfall Descriptions

Stormwater in the J&L Tank Field can be retained in tank dikes for infiltration and evaporation, or removed via vacuum trucks or manual pumping to the refinery process sewer system if an oil sheen is present. If the stormwater has no visible oil sheen, it can be routed to Outfalls 003 or 004 either manually by vacuum trucks or by a pumping system. Stormwater outside of the tank dikes is either collected in low lying areas for infiltration, or overflows to the west ditch and into the Turning Basin through Outfall 003, or overflows to the East Ditch to the Indiana Harbor Ship Canal through Outfall 004. Outfalls 003 and 004 are fed by vegetated drainage ditches controlled by sluice gates. Additionally, a limited amount of stormwater enters directly into the Indiana Harbor Ship Canal from the south end of the highlands (high ground south of J&L tank fields) during heavy runoff events as overland sheet flow. On the west side of J&L Tank Field, a small amount of runoff enters the Calumet Avenue Drain which drains to the Indiana Harbor Ship Canal.

Stormwater Control Features

Outfalls 003 and 004 currently discharge stormwater runoff from the southwest quadrant of the refinery. The area identified as West Ditch Drainage Area discharges stormwater through Outfall 003 to the Indiana Harbor Ship Canal to the south. The area identified as East Ditch Drainage Basin discharges stormwater through Outfall 004 to the Indiana Harbor Ship Canal. The West Ditch (to Outfall 003) and the East Ditch (to Outfall 004) are oriented from north to south on either side of the J&L Site.

Stormwater from Lake George Tank Field discharges via an underground pipe beneath Cline Avenue to the East Ditch and Outfall 003. Outfalls 003 and 004 are controlled by manually operated sluice gates. These outfalls are inspected daily for any water quality concerns. The sluice gates are opened once per week (usually Monday morning) only after inspection and verification that the discharge is within compliance limits.

Industrial Activities

The northern section of J&L and Lake George Area is a crude oil tank field, whereas the southern section is a multiuse area that is fairly undeveloped and used for material laydown and storage. Lake George Tank Field also contains paved areas for trailers and parking and includes routing of stormwater from the Calumet Avenue warehouse area.

The West Ditch Drainage Basin (Outfall 003) is covered by medium vegetation. This area also contains over 6,400 linear feet of roadway (paved). The J&L Tank Field consists of product storage areas bound on the north by a public roadway, on the east by railroad property, on the south by the Lake George Branch of the Indiana Harbor Ship Canal, and on the west by a public roadway. All tank dikes are typically void of vegetation cover. Vehicle access through and around the areas is via a series of asphalt paved and gravel roads situated on top of the dike walls. The west half of the J&L Tank Field contains 6 large tanks used primarily for the bulk storage of crude oil. Each tank has secondary containment in the form of tank dike. A channel, which originates north of the J&L Tank Field, and runs about 6,180 feet, is approximately 6 feet wide at the bottom and averages approximately 5 feet in depth. There are two flow control gates for regulating stormwater flows. The control measures for this basin include sediment rock check dams, detention basins, diversion channels, control gates, and sediment control structures throughout the area.

The East Ditch Drainage Basin (Outfall 004) is covered by medium vegetation with approximately 1.5 acres covered with heavy vegetation. There are approximately 8,600 linear feet of roads in this drainage basin segment. This area also includes the abandoned Liquid Petroleum Gas (LPG) loading racks and the associated remnant or abandoned rail car access, and lay down areas. A series of drainage channels approximately 3,950 feet in length collect runoff and route it to the East Ditch. Soil erosion controls consist of a detention pond, sediment traps, and slope roughening and diversion dikes.

Stormwater Run-on

Stormwater run-on to the J&L Tank Field occurs from Calumet Avenue and from the B & O Railroad. Calumet Avenue runs the entire western length and its associated drainage ditch connects the Indiana Harbor Ship Canal with Lake George to the north. The J&L Tank Field receives water from Calumet Avenue pavement, 129th Street ditch, Cline Avenue ditches, and properties north of 129th Street including the Lost Marsh Golf Course. This stormwater flows through the Calumet Avenue Ditch on the west side of the property and drains directly to the Indiana Harbor Ship Canal. This run-on will not mix with stormwater from industrial activity because there is no hydraulic connection. At the northeast corner of the property, some stormwater enters the J&L property from the B&O Railroad. However, this run-on is minimal and stays without leaving the property.

Non-Stormwater Discharges

Non-stormwater discharges within the J&L and Lake George Area to Outfalls 003 and 004 may include the following:

- Fire training or system flushing;
- Potable water sources including waterline flushing;
- Uncontaminated ground water;
- Routine exterior building wash down which does not use detergents or other compounds;
- Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred and where detergents are not used;
- Air conditioning condensate; and
- Equipment Hydro-testing using fire water.

Specific fire training activities include health, safety, security, and environment (HSSE) training and fire brigade training at the J&L training area, and fire hydrant flushing. HSSE training occurs from June to October, four days per week, with a flow rate of approximately 125 gallons per minute (GPM). Fire brigade training sessions occur once in May, June, and July and use approximately 60,000 gallons per session. This water is retained by natural depressions, infiltrates to ground water, or a small amount drains to a sump pump east of Tank 3915 where it goes to the refinery process sewer.

Additionally, this area is under a forced agreement remediation project with Indiana Department of Environmental Management (IDEM) where multiple well point systems are in operation for ground water remediation. As contaminants are pumped out of the ground there is possibility for some stormwater contamination from condensation or equipment rain wash-off.

Management of Stormwater Under Agreed Order

In 1995, Amoco Oil Company Whiting Refinery voluntarily entered into an agreed order, Cause Number H-11187, with the IDEM. This order was for the mutual purpose of mitigating any threat to human health and the environment, to perform a Resource Conservation and Recovery Act (RCRA) Facility Investigation, and perform a Corrective Measures study to identify and evaluate alternatives for the corrective action necessary to prevent or mitigate any migration of releases of hazardous waste. This order includes a work plan for the J&L site. This work plan identified 27 pits that were generally cleaned up in 1977 and interim measures were put in place to prevent and abate off-site migration of contaminants. It is currently proposed to remove the requirements of this Agreed order for

the J&L site and maintain stormwater compliance under the NPDES permit Industrial SWPPP for this area.

2.2 Outfall Locations

OUTFALL 002	Latitude:	41º 40’ 36”
	Longitude:	87º 28’ 16”
OUTFALL 003	Latitude:	41º 38’ 59”
	Longitude:	87º 30’ 17”
OUTFALL 004	Latitude:	41º 38’ 48”
	Longitude:	87º 29’ 51”
OUTFALL 005	Latitude:	41º 41’ 03”
	Longitude:	87º 28’ 05”

2.3 Wastewater Treatment

Outfall 005 (Outfall 001 when bypassing the Diffuser)

The WWTP that discharges through Outfall 005 receives and treats wastewater from normal refinery operations including maintenance, turnaround activities, excavation, dewatering, construction activities, tank cleaning, and temporary flows from upsets or downtime. Such temporary flows include, as necessary, the retreatment of off-spec WWTP effluent that has been temporarily stored in alternate storage locations via the firewater recycle system rather than discharged to Lake Michigan. The temporarily stored off-spec WWTP effluent would then be rerouted back through the WWTP for additional treatment and final discharge. In addition, it should be noted that the process sewers are part of the wastewater collection system.

Over the past five years, BP Whiting has discharged a long term average of 15.7 million gallons per day (MGD) and a maximum monthly average of 19.9 MGD of treated process wastewater from water used in the refinery, recovered ground water and most of the storm water from the site through their wastewater treatment plant through the diffuser located in Lake Michigan to Outfall 005. The wastewater treatment plant is an advanced biological treatment system which occupies twenty acres and includes a grit chamber, oil/water separators, dissolved air flotation, an activated sludge plant and final filtering processes. BP also accepts and treats wastewater at the wastewater treatment plant from NiSource Whiting Clean Energy and Ineos PIB Unit (formerly BP Chemical Plant). All on-site remediation ground water is sent to the wastewater treatment plant. Off site BP Facilities such as pipelines and terminals may produce wastewater from tank inspections, from hydro testing of equipment, from dewatering operations of equipment for maintenance, or other wastewater produced from normal operations. The BP Products Refinery facility will treat this wastewater and recover any hydrocarbons as needed.

Whiting Clean Energy

Whiting Clean Energy supplies BP with steam and electricity. The closed cycle cooling towers operated by Whiting Clean Energy have a blowdown which is sent to the BP wastewater treatment plant (WWTP).

Ineos

The Ineos facility sends wastewater from a polybutene manufacturing/processing unit (PIB unit) to the BP wastewater treatment plant. The PIB unit has sent their wastewater to the BP WWTP for many years and this wastewater was included in previous NPDES permits. When Ineos became an independently owned facility, the BP WWTP had to be evaluated for being a centralized waste treatment facility (CWT). There is an exclusion from being a CWT found in 40 CFR 437.1(b)(3) which states:

"Wastewater from the treatment of wastes received from off-site via conduit from the facility that generates the wastes unless the resulting wastewaters are commingled with other wastewaters subject to this provision." Therefore, as long as the wastewater from the PIB unit continues to be delivered to the BP WWTP via pipeline, this exclusion for off-site wastewater delivered by conduit will apply and the BP WWTP is not subject to the CWT regulations.

Whiting Clean Energy, Praxair, Ineos, and Griffith LPG Cavern storage dewatering. In addition, all on site remediation groundwater is sent to the wastewater treatment facility. Further, consistent with 40 CFR 437.1 (b)(2)(b), offsite facilities (both BP and non-BP owned) such as pipelines and terminals may produce other wastewater from activities including tank inspections, hydro testing of equipment, dewatering operations, equipment clean out from maintenance and turnaround activities, dewatering of equipment, and other wastewater, which may be sent to the BP wastewater treatment plant for oil recovery and wastewater treatment.

40 CFR Part 437.1 (b)(2):

(b) This part does not apply to the following discharges of wastewater from a CWT facility:
(1) Wastewater from the treatment of wastes that are generated on-site when the wastes generated on-site are otherwise subject to another part of subchapter N.
(2) Wastewater from the treatment of wastes that are generated off-site if the discharger: a) demonstrates that the off-site wastes are generated at a facility that is subject to the same provisions in 40 CFR subchapter N as non-CWT wastes generated at the CWT facility or b) demonstrates that the off-site wastes are of similar nature and the treatment of such wastes are compatible with the treatment of non-CWT wastes generated and treated at the CWT.
(3) Wastewater from the treatment of wastes received from off-site via conduit (e.g., pipelines, channels, ditches, trenches, etc.) from the facility that generates the wastes unless the resulting wastewaters are commingled with other wastewaters subject to this provision. A facility that acts as a waste collection or consolidation center is not a facility that generates wastes.

Outfall 002

Over the past five years, BP Whiting has discharged a long term average of 73.7 MGD and a maximum monthly average of 86.2 MGD of non-contact cooling water to Outfall 002. The flow values for Outfall 002 were submitted by BP in the February, 2012 NPDES Permit Renewal Application Update.

Outfalls 003 and 004

BP Whiting discharges storm water associated with industrial activity from an area on the South side of the BP Whiting property through Outfalls 003 and 004 using a manually controlled valve. When the level of water in the ditch is high, the water is released to the canal. The storm water is managed through the use of a Spill Prevention, Control and Countermeasure Plan, a storm water pollution prevention plan, a Facility Response Plan, and Agreed Order No. H-11187 which defined eight interim measures to be implemented at the J & L site in which Outfalls 003 and 004 are located.

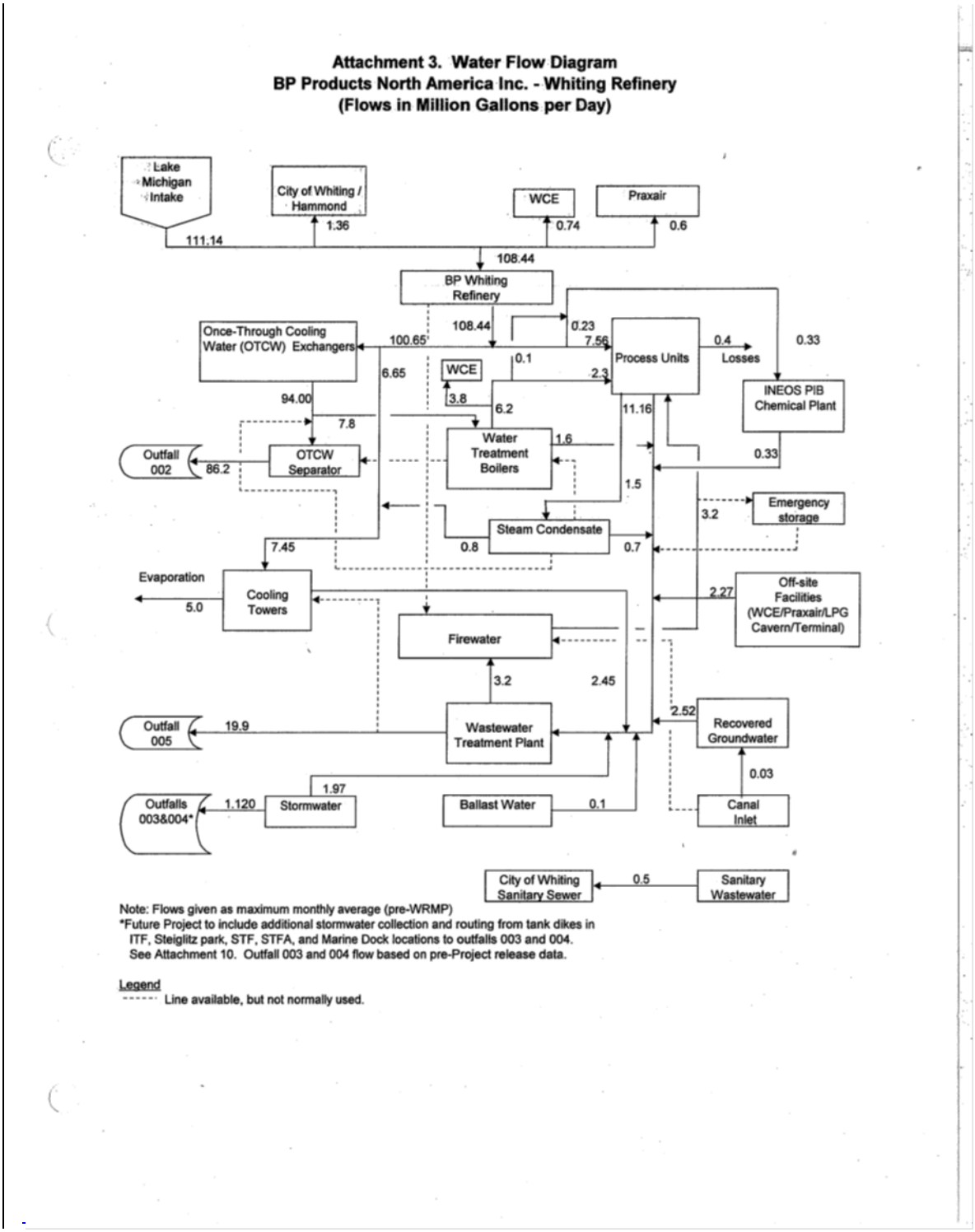


Figure 3: Refinery Flow Diagram

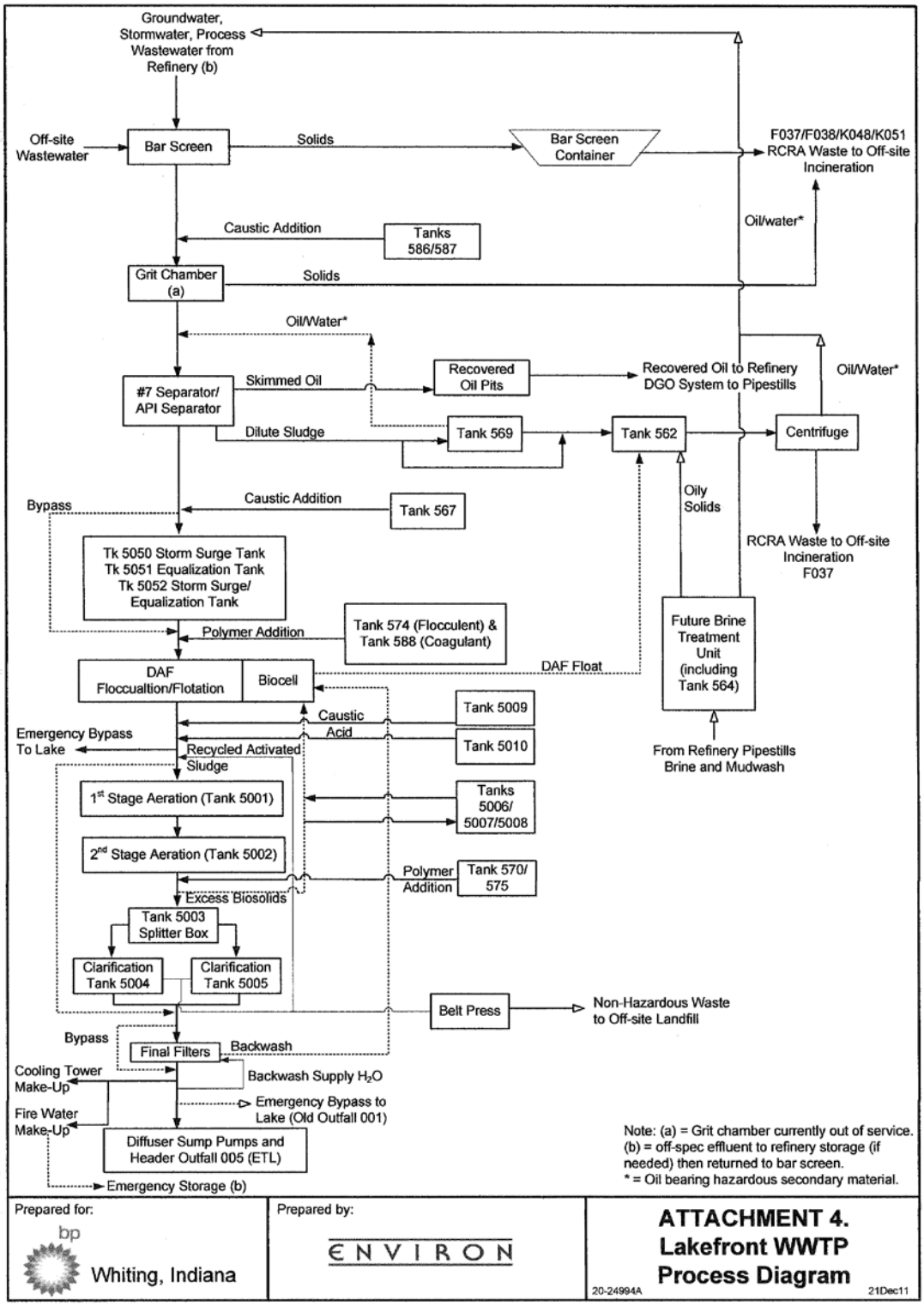


Figure 4. Lakefront WWTP Flow Diagram

The permittee shall have the wastewater treatment facilities under the responsible charge of an operator certified by the Commissioner in a classification corresponding to the classification of the wastewater treatment plant as required by IC 13-18-11-11 and 327 IAC 5-22-5. In order to operate a wastewater treatment plant the operator shall have qualifications as established in 327 IAC 5-22-7. Based upon the information provided, IDEM has retained the permittee a Class D industrial wastewater treatment plant classification.

2.4 Changes in Operation

Refinery Process Units

New - #2 Coker: The existing coker (No. 11 B Pipe Still) will be shut down and replaced with a new coker (#2 Coker).

New - Enclosed Coke Handling System: The existing open coke yard will be shut down and replaced with a new enclosed coke handling system.

New - GOHT: A new Gas Oil Hydrotreating Unit (GOHT) will be installed to hydrotreat gas oil.

New - Cooling Towers: Two new cooling towers (Cooling Towers 7 & 8) will be installed to meet the cooling requirements for the WRMP.

New- Flares: Two new flare stacks will be installed in support of the WRMP.

Upgrade- No. 12 Pipestill: The existing No. 12 Pipestill (12PS) will be revamped to allow increased processing of heavy crude.

Upgrade - Sulfur Recovery Complex: Due to the higher sulfur content of the heavy crudes, additional lower sulfur fuels units will be installed.

Upgrade - Distillate Hydrotreating Unit: A new reactor and a new heater will be installed at the Distillate Hydrotreating Unit .

Upgrade - No. 11C Pipestill: Ultra-low NOx burners will be installed on the 11C PS Heater H-200 to reduce NOx emissions from this heater.

Upgrade - Aromatics Recovery Unit: Some minor modifications will be made at the ARU to process lighter feed.

Upgrade - No. 4 Ultraformer: Due to an increase in the naphtha feed rate to the existing 4UF, the front end reactor will be upgraded..

Upgrade - Existing Cooling Towers: High efficiency liquid drift eliminators will be installed on the existing Cooling Towers 2, 3, and 4 to reduce particulate emissions.

Upgrade - Distillate Desulfurization Unit: Some minor modifications will be made to the Distillate Desulfurization Unit (DDU).

Upgrade - Vapor Recovery Unit: Several modifications will be made to the VRU 300 to process a larger amount of lighter naphtha feed with the WRMP.

Upgrade- Fuel Gas System: As part of the WRMP, enhancements will be made to the refinery's fuel gas system to achieve a future potential total reduced sulfur (TRS) content.

Upgrade - Blending Oil Unit: Modifications will be made to the Blending Oil Unit heater.

Upgrade - Fluid Catalytic Cracking Unit 600: Several modifications will be made on the FCU 600 unit to accommodate an increase in throughput.

Upgrade - Propylene Concentration Unit: Modifications and additions will be made to the PCU to produce more RGP (refinery grade propylene) and minimize the production of PGP (polymer grade propylene).

Shutdowns - BP will permanently shut down and remove from service a number of units as a result of the installation of new units and the modification of certain existing units comprising WRMP. The following existing units will be permanently shut down as part of WRMP:

- No. 118 Coker Heaters H-101, 102, 103, and 104
- Existing Coke Handling System
- Beavon-Stretford Tail Gas Unit
- SBS Tail Gas Unit
- SBS Cooling Tower
- SRU Incinerator
- No. 12 PS Heaters H-2, H-1AS/1AN, H-1CN, H-18, H-1CX
- No. 4C Treating Plant
- No. 3 Ultraformer reformer section and heaters H-1, H-2 and F-7
- The 350 section of VRU 300
- No. 1 SPS Boilers

<u>WWTP Units</u>

New - Brine Treatment System: A new brine treatment system will be installed for treatment of the wastewater brine from the refinery's pipe still operations. The system is designed to separate the oily emulsified solids from the brine using new GLR micro-bubble technology. Chemistry is used to coagulate and flocculate the oil droplets to trap much of the solids into the oil phase. The GLR Gas Floatation Tanks (GFT) are designed to separate the oil (and consequently any solids entrained in the oil) and the water. The oil and solids that are created and separated by the brine treatment unit will be sent to the refinery solids handling system. The system will consist of four fixed-roof tanks to be located at the WWTP and two off-spec tanks which will be located in the
refinery and equipped with external floating roofs.

New – Storm water/Equalization Tank: A new wastewater storage tank (TK-5052) with a capacity of 11,676,000 gallons and equipped with an external floating roof has been installed to provide additional storage volume for storm water surges and to provide
additional equalization capacity. Extra surge capacity allows the WWTP to better respond to high storm water flows such as those experienced during heavy rain events.
The extra equalization capacity allows a better response to process upsets that may

temporarily increase the TSS or total nitrogen in the influent flow to the WWTP. The new tank TK-5052 is equipped with foam chambers, a guided wave radar level transmitter, an oil skimmer, an automatic sample collection system, and a jet mixing system to prevent solids accumulation. Start up was completed December 2009 with a corresponding notice sent to IDEM for additional WWTP equipment installation.

New - Final Filters: The existing final filters at the WWTP will be replaced with new final filters with a capacity of 32.1 MGD. The new Final Filters are of the gravity mono/multimedia type, with two clusters of four filter cells each, totaling eight filter cells. Influent flow is gravity fed from the clarifiers and splits equally between the two filter clusters. Flow to each of the cells within a cluster is distributed evenly by means of adjustable inlet weirs. Flow from the bottom of each cell is directed to a dedicated effluent chamber with adjustable weirs. The water flows over the adjustable weirs to a common transfer pit. Filtered water from the common transfer pit is tied into the existing 42" effluent piping, and will flow to the interceptor box, and out to the lake via Outfall 005. During backwash operation, seven of the eight total cells continue to operate normally, with one cell being placed in backwash mode.

New/Upgrade - Dissolved Air Flotation (DAF): Under the proposed USEPA Consent Decree, BP will be required to complete construction and installation of a new DAF unit that will replace the existing DAF unit.

2.5 Facility Storm Water

The storm water from the refinery is routed through the wastewater treatment plant and discharged through Outfall 005. A new wastewater storage tank (TK-5052) with a capacity of 11,676,000 gallons and equipped with an external floating roof has been installed to provide additional storage volume for storm water surges and to provide additional equalization capacity.

BP Whiting discharges storm water associated with industrial activity from an area on the South side of the BP Whiting property through Outfalls 003 and 004. The storm water is managed through the use of a Spill Prevention, Control and Countermeasure Plan, a storm water pollution prevention plan, a Facility Response Plan, and Agreed Order No. H-11187 which defined eight interim measures to be implemented at the J & L site in which Outfalls 003 and 004 are located.

3.0 PERMIT HISTORY

3.1 Compliance history

The following violations have occurred over the past two years:

Outfall 005

pH limit of 9.0 was exceeded in January, 2010
CBOD lbs/day daily maximum lbs/day limit was exceeded in April, 2011
Oil & Grease daily maximum lbs/day limit was exceeded in April, 2011
Total Suspended Solids daily maximum lbs/day limit was exceeded in April, 2011
Phosphorus daily maximum mg/l limit was exceeded in November, 2011
Biomonitoring reports for the following months were conducted by BP and all of the tests passed: December, 2007; April, 2008; October, 2008; April, 2009; November, 2009; April, 2010; October, 2010; April, 2011; October, 2011 and April, 2012.

https://icis.epa.gov/icis/jsp/common/LoginBody.jsp
[Link to ICIS]

4.0 RECEIVING WATER

1. Receiving Waters:

Lake Michigan – Lake Michigan is the receiving water for outfalls 001, 002 and 005.

Lake George Branch of the Indiana Harbor Ship Canal – The Lake George Branch of the Indiana Harbor Ship Canal is the receiving water for Outfalls 003 and 004. The low flow condition of this stream is not relevant since the only discharge to this stream is generated by storm water.

2. Use Classification (327 IAC 2-1.5-19):

Lake Michigan – Lake Michigan is designated as an outstanding state resource water (OSRW) and shall be maintained and protected in its present high quality without degradation in accordance with 327 IAC 2-1.5-4(c). Lake Michigan is also designated for full-body contact recreation and capable of supporting a well-balanced warm water aquatic community. The Indiana portion of the open waters of Lake Michigan is designated as salmonid waters and shall be capable of supporting a salmonid fishery. Lake Michigan is protected by Indiana rules governing water quality standards for the Great Lakes Basin and as such, it is subject to the water quality standards specific to Great Lakes system dischargers as found in 327 IAC 2-1.5, 327 IAC 5-1.5, and 327 IAC 5-2 (see Great Lakes System Discharger Requirements, Section F of the Fact Sheet for more information).

Lake George Branch of the Indiana Harbor Ship Canal – The Lake George Branch of the Indiana Harbor Ship Canal is located within the Great Lakes Basin and is protected by Indiana rules governing water quality standards for the Great Lakes Basin and as such, it is subject to the water quality standards specific to Great Lakes system dischargers as found in 327 IAC 2-1.5, 327 IAC 5-1.5, and 327 IAC 5-2 (see Great Lakes System Discharger Requirements, Section F of the Fact Sheet for more information). The Lake George Branch of the Indiana Harbor Ship Canal is classified as a high quality water that is also a tributary to an OSRW.

3. Alternate Mixing Zone

Under 327 IAC 5-2-11.4(b)(2), except for a zone of initial dilution for acute aquatic criteria, wasteload allocations for discharges to the open waters of Lake Michigan shall be based on meeting water quality criteria in the undiluted discharge unless a mixing zone demonstration is conducted and approved by IDEM under 327 IAC 5-2-11.4(b)(4). If an alternate mixing zone is approved for a discharge to the open waters of Lake Michigan, wasteload allocations shall be based on meeting water quality criteria outside of the applicable alternate mixing zone. Under 327 IAC 5-2-11.4(b)(4)(C), an alternate mixing zone shall not be granted for a discharge into the open waters of Lake Michigan that exceeds the area where discharge-induced mixing occurs.

Prior to the issuance of the existing NPDES permit in 2007, BP Products submitted an alternate mixing zone demonstration in accordance with 327 IAC 5-2-11.4(b)(4) for a discharge through a submerged diffuser. The demonstration included a site specific study in which the ambient currents at the proposed diffuser location were measured over a 45 day period. Based on the

information obtained as part of the site-specific study, BP Products modeled the discharge through the submerged diffuser for sixteen different current directions and the associated average current velocities. They used the U.S. EPA supported mixing zone model CORMIX to determine the dilution that occurs at the edge of the discharge-induced mixing zone.

After reviewing the mixing zone demonstration submitted by BP Products and conducting additional mixing zone modeling using CORMIX, a design case for the diffuser was chosen to calculate the dilution factor under critical conditions. At the effluent flow of 21.4 MGD, the diffuser will achieve a dilution factor of 37.1:1 at the edge of the discharge-induced mixing zone. The dilution factor is a weighted average that was calculated using the dilution obtained from the CORMIX model for each of the sixteen current directions and the frequency of occurrence of each current direction. The discharge-induced mixing zone extends a distance of 182 feet from the diffuser and its location will change as the current direction changes. The dilution factor was used in accordance with 327 IAC 5-2-11.4(c) to calculate wasteload allocations for all of the pollutants of concern except for Mercury. A mixing zone for Mercury has not been approved for the BP Products discharge to the open waters of Lake Michigan. The NPDES permit tracking system includes the latitude and longitude associated with each outfall number. Since the location of the discharge changed from the shore (Outfall 001) to the diffuser, the outfall number has to be changed to reflect the change in location. The discharge from the diffuser is designated as Outfall 005.

This alternate mixing zone was evaluated by the Biological Studies Section of the Office of Water Quality of IDEM in accordance with 327 IAC 5-2-11.4(b)(4) to ensure that the mixing zone does not:

1. Interfere with or block passage of fish or aquatic life,
2. Jeopardize the continued existence of an endangered or threatened species or result in the destruction or adverse modification of such species' habitats,
3. Extend to drinking water intakes,
4. Impair or otherwise interfere with the designated uses of the receiving water,
5. Promote undesirable aquatic life or result in a dominance of nuisance species,
6. Allow substances to settle to form objectionable deposits,
7. Allow floating debris, oil, scum, and other matter in concentrations that form nuisances,
8. Allow objectionable color, odor, taste or turbidity, or
9. Cause adverse effects to human health, aquatic life or wildlife.

Pursuant to 327 IAC 5-2-11.4(b)(6), the Commissioner has evaluated all available information, including information submitted by the public, relevant to the consideration of harm to human health, aquatic life, or wildlife, and has determined, based on IDEM's evaluation that is part of the agency record for this permit, that the alternate mixing zone will not cause any of the above-noted adverse impacts. Therefore, with the issuance of the existing NPDES permit, the Commissioner approved and granted the application of the alternate mixing zone in accordance with 327 IAC 5-2-11.4(b)(4). Further in accordance with IC 13-18-4-7, the Commissioner has determined that the applicant has demonstrated that the alternate mixing zone will not cause harm to human health or aquatic life.

BP has requested that the frequency of the biological survey of the aquatic life around the diffuser, given in Part I.H.2 of the existing permit, be reduced from annually to the first, third, and fifth year of the renewed permit. The frequency may be increased if findings suggest

significant changes in monitored biological/chemical characteristics. Annual biological surveys were conducted under the terms of the existing permit in July 2009 (pre-diffuser), August 2010 (post-diffuser), and July 2011. The data have shown that there have been no significant changes (relative to historic lake conditions) to the biotic community from year to year. The reduced monitoring frequency will be sufficient to identify trends in biological community structure and composition in future years.

IDEM agrees that the conditions surrounding the diffuser have not changed significantly over the term of the existing permit and will grant the request to conduct the biological survey during the first third and fifth year of the renewed permit.

4.1 Receiving Stream Water Quality

Section 303(d) of the Clean Water Act requires states to identify waters, through their Section 305(b) water quality assessments, that do not or are not expected to meet applicable water quality standards with federal technology based standards alone. States are also required to develop a priority ranking for these waters taking into account the severity of the pollution and the designated uses of the waters. Once this listing and ranking of impaired waters is completed, the states are required to develop Total Maximum Daily Loads (TMDLs) for these waters in order to achieve compliance with the water quality standards. A TMDL is the total amount of a pollutant that can be assimilated by the receiving water while still achieving water quality standards.

Indiana's 2010 303(d) List of Impaired Waters is developed in accordance with Indiana's Water Quality Assessment and 303(d) Listing Methodology for Waterbody Impairments and Total Maximum Daily Load Development for the 2010 Cycle. U.S. EPA under Section 303(d) of the Clean Water Act approved the Lake Michigan Shoreline TMDL report on September 1, 2004 for four impairments. TMDL reports identify and evaluate water quality problems in impaired water bodies and propose solutions to bring those waters into attainment with water quality standards.

The Lake Michigan Shoreline is on the 2010 303(d) list for E. coli., Mercury and PCBs. Mercury and PCBs are on the list due to fish consumption advisories for those substances.

http://www.in.gov/idem/nps/2348.htm
[link to water quality-limited database – 303d list]

http://www.in.gov/idem/nps/2652.htm
[link to TMDL web site]

5.0 PERMIT LIMITATIONS

Two categories of effluent limitations exist for NPDES permits: Technology-Based Effluent Limits (TBELs) and; Water Quality-Based Effluent Limits (WQBELs).

TBELs are developed by applying the National Effluent Limitation Guidelines (ELGs) established by USEPA for specific industrial categories TBELs are the primary mechanism of control and enforcement of water pollution under the Clean Water Act (CWA). Technology based treatment requirements under section 301(b) of the CWA represent the minimum level of control/treatment using available technology that must be imposed in a section 402 permit [40 CFR 125.3(a)].

In the absence of ELGs, effluent limits can also be based upon Best Professional Judgment (BPJ). Accordingly, every individual member of a discharge class or category is required to operate their water pollution control technologies according to industry-wide standards and accepted engineering practices. This means that TBELs based upon a BPJ determination are applied at end-of-pipe and mixing zones are not allowed [40 CFR 125.3(a)]. Similarly, since the statutory deadlines best practicable technology (BPT), best available technology economically achievable (BAT) and best conventional control technology (BCT) have all passed; compliance schedules for these TEBLs are also not allowed.

WQBELs are designed to be protective of the beneficial uses of the receiving water and are independent of the available treatment technology. The WQBELs for this facility are based on water quality criteria in 327 IAC 2-1.5-8 or under the procedures described in 327 IAC 2-1.5-11 through 327 IAC 2-1.5-16 and implementation procedures in 327 IAC 5. Limitations and/or monitoring are required for parameters identified by applications of the reasonable potential to exceed WQBEL in accordance with 327 IAC 5-2-11.5.

According to 40 CFR 122.44 and 327 IAC 5, NPDES permit limits are based on either TBELs, where applicable, BPJ, or WQBELs, whichever is most stringent. The decision to limit or monitor the parameters contained in this permit is based on information contained in the permittee's NPDES application. In addition, when performing a permit renewal, existing permit limits must be considered. These may be TBELs, WQBELs, or limits based on BPJ. When renewing a permit, the anti-backsliding provisions identified in 327 IAC 5-2-10(11) are taken into consideration.

- Narrative Water Quality Based Limits

  The narrative water quality contained under 327 IAC 2-1.5-8(b)(1) (A)-(E) have been included in this permit to ensure that the narrative water quality criteria are met.

- Numeric Water Quality Based Limits

  The numeric water quality criteria and values contained in this permit have been calculated using the tables of water quality criteria under 327 IAC 2-1.5-6(c) & (d).

5.1 Existing Permit Limits

Outfall 005 (formerly Outfall 001) with an Alternate Mixing Zone

DISCHARGE LIMITATIONS
TABLE I
Numeric Discharge Limitations, Sampling, and Monitoring Requirements

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
Parameter	Monthly Average	Daily Maximum	Units	Monthly Average	Daily Maximum	Units	Measurement Frequency	Sample Type
Flow	Report	Report	MGD	----	----	----	Daily	24-Hr. Total
$TBOD_5$	4,161	8,164	lbs/day	Report	Report	mg/l	1 x Weekly	24 Hr. Comp.
TSS	4,925	7,723	lbs/day	Report	Report	mg/l	2 x Weekly	24 Hr. Comp.
COD	30,323	58,427	lbs/day	Report	Report	mg/l	1 x Weekly	24 Hr. Comp.
Oil and Grease	1,368	2,600	lbs/day	Report	Report	mg/l	1 x Weekly	Grab
Phenolics (4AAP)	20.33	73.01	lbs/day	Report	Report	mg/l	1 x Weekly	24 Hr. Comp.
Ammonia as N	1,584	3,572	lbs/day	Report	Report	mg/l	5 x Weekly	24 Hr. Comp.
Sulfide	23.1	51.4	lbs/day	Report	Report	mg/l	1 x Weekly	24 Hr. Comp.
Total Chromium	23.9	68.53	lbs/day	Report	Report	mg/l	1 x Weekly	24-Hr. Comp.
Hex. Chromium	2.01	4.48	lbs/day	Report	Report	mg/l	1 x Weekly	Grab
Total Vanadium								
Interim	Report	Report	lbs/day	Report	Report	mg/l	1 x Monthly	24-Hr. Comp.
Final	50	100	lbs/day	0.28	0.56	mg/l	1 x Monthly	24-Hr. Comp.
Total Mercury								
Interim	Report	Report	lbs/day	Report	Report	ng/l	2 x Yearly	Grab
Final	0.00023	0.00057	lbs/day	1.3	3.2	ng/l	6 x Yearly	Grab
Phosphorus	Report	Report	lbs/day	Report	1.0	mg/l	1 x Weekly	24 Hr. Comp.
Whole Effluent Toxicity								
Chronic	-	-	-	Report	-	TUc	2 x Yearly	
pH	-	-	-	-	[1]	s.u.	3 x Weekly	Grab

Total Mercury Variance Effluent Limits Outfall 005

	Quality or Concentration			Monitoring	
Parameter	Annual Average	Daily Maximum	Units	Measurement Frequency	Sample Type
Total Mercury	23.1	Report	ng/l	6 x Yearly	Grab

Outfall 002

TABLE I
Numeric Discharge Limitations, Sampling, and Monitoring Requirements

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
Parameter	Monthly Average	Daily Maximum	Units	Monthly Average	Daily Maximum	Units	Measurement Frequency	Sample Type
Flow	Report	Report	MGD	----	----	----	Daily	24-Hr. Total
TOC (Intake)	-	-	-	Report	Report	mg/l	1 x Yearly	Grab
TOC (Discharge)	-	-	-	Report	Report	mg/l	1 x Yearly	Grab
TOC (Net)	-	-	-	Report	5.0	mg/l	1 x Yearly	Grab
Total Residual Chlorine	20.0	60.0	lbs/day	0.01	0.02	mg/l	1 x Weekly	Grab
Oil and Grease	-	-	-	Report	5.0	mg/l	1 x Monthly	Grab
Temperature								
Intake	-	-	-	Report	Report	BTU/Hour	5 x Weekly	Hourly
Discharge	-	-	-	Report	Report	BTU/Hour	5 x Weekly	Hourly
Net (daily average)	-	-	-	1.7×10^9	2×10^9	BTU/Hour	5 x Weekly	Hourly
pH	-	-	-	-	[1]	s.u.	3 x Weekly	Grab

Outfalls 003 and 004

TABLE I
Numeric Discharge Limitations, Sampling, and Monitoring Requirements

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
Parameter	Monthly Average	Daily Maximum	Units	Monthly Average	Daily Maximum	Units	Measurement Frequency	Sample Type
Flow	Report	Report	MGD	----	----	----	Daily	24-Hr. Total
TOC	-	-	-	Report	110	mg/l	1 x Weekly	Grab
Oil and Grease	-	-	-	Report	15	mg/l	1 x Weekly	Grab
pH	-	-	-	-	[1]	s.u.	1 x Weekly	Grab

5.2 Technology-Based Effluent Limits

The facility is designated as a major NPDES permitted facility with a SIC code of 2911-Petroleum Refining. The facility is subject to the Water Quality Based Effluent Limitations contained in 327 IAC 2 and 327 IAC 5, and it is subject to the Federal Effluent Guideline in 40 CFR 419. Therefore review and approval of the final permit by the US EPA Region 5 will be required.

According to 40 CFR 122.44 and 327 IAC 5, NPDES permit limits are based on either technology-based limitations, where applicable, best professional judgment (BPJ), or Indiana Water Quality-Based Effluent Limitations (WQBEL's), whichever is most stringent. The decision to limit or monitor the parameters contained in this permit is based on information contained in the permittee's NPDES application, the previous permit, and additional research conducted pursuant to the development of this permit.

- <u>EPA Effluent Guidelines -- Existing Source Standards (BAT/BPT)</u>

The U.S. EPA has established technology-based effluent guidelines for petroleum refining facilities. Since this facility is classified as an "existing point source", all discharges are subject to effluent guidelines identified in 40 CFR 419. The applicable effluent guidelines are as follows on the next three pages:

Outfall 005

Effluent Limitations based on the Federal Effluent Guidelines (40 CFR Part 419) for the CXHO Configuration

EPA Process Name	Process Rate 1000 Bbl/day	Weighting Factor	Process Rate/ Feedstock Rate	Unit Process Configuration Factor
Crude Processes				
Atmospheric Crude Distil.	420.0		1	
Crude Desalting	420.0		1	
Vacuum Crude Distillation	240.3		0.572	
Sum	1080.3	1	2.572	2.572
Cracking and Coking Processes				
Fluid Catalytic Cracking	172.0		0.410	
Delayed Coking	102.0		0.243	
Hydroprocessing	441.3		1.051	
Sum	715.3	6	1.703	10.219
Asphalt Processes				
Asphalt Production	33.9			
Sum	33.9	12	0.081	0.969
Reforming and Alkylation Processes				
Sulfuric Acid Alkylation	29.0			
Catalytic Reforming	70.0			
Sum	99.0			
feedstock rate (1,000 Bbl/day)		420.0	**Total**	13.76

Weighting Factor based on the table in 40 CFR 419.42(b)(3)

Size Factor:

Based on the table in 40 CFR 419.22(b)(1), 419.24(b)(1) = 1,000 BBL of Feedstock per stream day (150.0 or greater), Size Factor = 1.41

Based on the table in 40 CFR 419.22(b)(2), 419.24 (b)(2) = Process Configuration Factor 9.5 or Greater, Process Factor = 1.89
Effluent Limits based on 40 CFR 419.23(c)(1)(i)

Based on 40 CFR 419.23(c)(1)(i) using the CXHO Configuration

Pollutant	Processes Included	Daily Maximum (lbs./1,000 Bbl of Feedstock)	Monthly Average (lbs./1,000 Bbl of Feedstock)	Feedstock Rate (1,000 Bbl of Feedstock)	Effluent Limits Daily Maximum (lbs/day)	Effluent Limits Monthly Average (lbs/day)
Phenolic Compounds	Crude	0.013	0.003	1.080.3	14.04	3.24
	Cracking & Coking	0.147	0.036	715.3	105.15	25.75
	Asphalt	0.079	0.019	33.9	2.68	0.64
	Reforming & Alkylation	0.132	0.032	99	13.07	3.17
	Total				134.94	32.8
Total Chromium	Crude	0.011	0.004	1.080.3	11.88	4.32
	Cracking & Coking	0.119	0.041	715.3	85.12	29.33
	Asphalt	0.064	0.022	33.9	2.17	0.75
	Reforming & Alkylation	0.107	0.037	99	10.59	3.66
	Total				109.77	38.06
Hexavalent Chromium	Crude	0.0007	0.0003	1.080.3	0.76	0.32
	Cracking & Coking	0.0076	0.0034	715.3	5.44	2.43
	Asphalt	0.0041	0.0019	33.9	0.14	0.06
	Reforming & Alkylation	0.0069	0.0031	99	0.68	0.31
	Total				7.01	3.13

Calculation of BPT, BAT and BCT Limitations using the CXHO Configuration

(a) Based on 40 CFR 419.22(a) and 419.24(a); (b) Based on 40 CFR 419.23(c)(1)(i)

Pollutant	Type of Effluent Limitation (a)	Daily Maximum Lbs/1,000 Bbl of Feedstock	Monthly Average Lbs/1,000 Bbl of Feedstock	Size Factor	Process Factor	Feedstock Rate 1,000 Bbl of Feedstock	Effluent Limitations BPT, BAT & BCT Daily Maximum Lbs/day	Effluent Limitations BPT, BAT & BCT Monthly Average Lbs/day	Other BAT Limits (b) Daily Maximum Lbs/day	Other BAT Limits (b) Monthly Average Lbs/day	Controlling Effluent Limitations Daily Maximum Lbs/day	Controlling Effluent Limitations Monthly Average Lbs/day
BOD5	BPT, BCT	**9.9**	5.5	**1.41**	1.89	420.0	11,080.65	6,155.92			11,081	6,156
TSS	BPT, BCT	**6.9**	4.4	**1.41**	1.89	420.0	7,722.88	4,924.74			7,723	4,925
COD	BPT, BAT	**74**	38.4	**1.41**	1.89	420.0	82,825.09	42,979.51			82,825	42,980
Oil and Grease	BPT, BCT	**3**	1.6	**1.41**	1.89	420.0	3,357.77	1,790.81			3,358	1,791
Phenolic Compounds	BPT	**0.074**	0.036	**1.41**	1.89	420.0	82.83	40.29	134.94	32.8	82.8	32.8
Ammonia as N	BPT, BAT	**6.6**	3	**1.41**	1.89	420.0	7,387.1	3,357.77			7,387	3,358
Sulfide	BPT, BAT	**0.065**	0.029	**1.41**	1.89	420.0	72.75	32.46			72.8	32.5
Total Chromium	BPT	**0.15**	0.088	**1.41**	1.89	420.0	167.89	98.49	109.77	38.06	109.8	38.1
Hex. Chromium	BPT	**0.012**	0.0056	**1.41**	1.89	420.0	13.43	6.27	7.01	3.13	7.01	3.13

5.3 Water Quality-Based Effluent Limits

The water quality-based effluent limitations for this facility are based on water quality criteria in 327 IAC 2-1.5-8 or under the procedures described in 327 IAC 2-1.5-11 through 327 IAC 2-1.5-16 and implementation procedures in 327 IAC 5.

- Oil and Grease
Oil and Grease limitations are based upon 327 IAC 5-5-2(h)(2) and are 15.0 mg/l Daily Maximum and 10.0 mg/l Monthly Average. Also, these limits are considered sufficient to ensure compliance with narrative water quality criteria in 327 IAC 2-1-6(a)(1)(C) that prohibits oil or other substances in amounts sufficient to produce color, visible sheen, odor, or other conditions in such a degree to create a nuisance.

-Flow
The permittee's flow is to be monitored in accordance with 327 IAC 5-2-13(a)2.

-pH
Limitations for pH in the proposed permit are taken from 327 IAC 2-1.5-8(c)(2).

WQBEL Rationale

The effluent was characterized by BP through sampling and analysis of their effluent and those data were provided to IDEM in the permit renewal application submitted on February 1, 2012 and through monthly discharge reports. On July 28, 2006, IDEM completed a wasteload allocation (7-28-2006 WLA) and evaluation of the reported effluent data to determine if the effluent contains pollutants at a level that has a reasonable potential to cause or contribute to an exceedance of the water quality criteria (RPE). The 7-28-2006 WLA was updated to include revised criteria for Vanadium based on new information provided by BP and to revise the design flow of the discharge to 19.9 MGD.

5.4 Whole Effluent Toxicity

The Indiana Water Quality Standards require that a discharge shall not cause acute toxicity, as measured by Whole Effluent Toxicity Tests (WETT), at any point in the water body and that a discharge shall not cause chronic toxicity, as measured by whole effluent toxicity tests, outside of the applicable mixing zone. Per Indiana Rule 327 IAC 5-2-11 .5(c)(2), the commissioner may include, in the NPDES permit, WETT requirements to generate the data needed to adequately characterized the toxicity of the effluent to aquatic life.

Therefore, the permittee is required to conduct WETT to determine the toxicity of the water treatment additives and process wastestreams that may be used at this site. This does not negate the necessity to submit Water Treatment Additive (WTA) approval worksheets for the additives proposed at this site.

5.5 Antibacksliding

None of the limits included in this permit conflict with anti-backsliding regulations found in 327 IAC 5-2-10(11), therefore, backsliding is applicable.

5.6 Antidegradation

In accordance with 327 IAC 2-1.3, the permittee is prohibited from undertaking any action that would result in the following:

a. A new or increased discharge of a bioaccumulative chemical of concern (BCC), other than mercury.

b. A new or increased discharge of mercury or a new or increased permit limit for a regulated pollutant that is not a BCC unless one of the following is completed prior to the commencement of the action:

(1) Information is submitted to the Commissioner demonstrating that the proposed new or increased discharges will not cause a significant lowering of water quality as defined under 327 IAC 2-1.3-2(50). Upon review of this information, the Commissioner may request additional information or may determine that the proposed increase is a significant lowering of water quality and require the permittee to do the following:

(i) Submit an antidegradation demonstration in accordance with 327 IAC 2-1.3-5; and

(ii) Implement or fund a water quality improvement project in the watershed of the OSRW that results in an overall improvement in water quality in the OSRW in accordance with 327 IAC 2-1.3-7.

(2) An antidegradation demonstration is submitted to and approved by the Commissioner in accordance with 327 IAC 2-1.3-5 and 327 IAC 2-1.3-6 and the permittee implements or funds a water quality improvement project in the watershed of the OSRW that results in an overall improvement in water quality in the OSRW in accordance with 327 IAC 2-1.3-7.

A review of information provided by BP Products was conducted to determine compliance with Indiana's Antidegradation Standards. Based on this review, the IDEM determined that the proposed discharges comply with the antidegradation standards found in 327 IAC 2-1.3 and an antidegradation demonstration is not required.

5.7 Stormwater

According to 40 CFR 122.26(b)(14)(ii), facilities classified as Standard Industrial Classifications 24 (except 2434), 26 (except 265 and 267), 28 (except 283), 29, 31l, 32 (except 323), 33, 344l, 373 are considered to be engaging in 'industrial activity' for purposes of 40 CFR 122.26(b). Therefore the permittee is required to have all storm water discharges associated with industrial activity permitted. Treatment for storm water discharges associated with industrial activities is required to meet, at a minimum, best available technology economically achievable/best conventional pollutant control technology (BAT/BCT) requirements. EPA has determined that non-numeric technology-based effluent limits have been determined to be equal to BPT/BAT/BCT for storm water associated with industrial activity.

Storm water associated with industrial activity must be assessed to determine compliance with all water quality standards. The non-numeric storm water conditions and effluent limits contain the technology-based effluent limitations. Effluent limitations, as defined in the CWA, are restrictions on quantities, rates, and concentrations of constituents which are discharged. Effective implementation of these requirements should meet the applicable water quality based effluent limitations. Violation of any of these effluent limitations constitutes a violation of the permit.

Additionally, IDEM has determined that with the appropriate implementation of the required control measures and Best Management Practices (BMPs) found in Part I.D. of the permit, the discharge of stormwater associated with industrial activity from this facility will meet applicable water quality standards and will not cause a significant lowering of water quality. Therefore, the storm discharge is in compliance with Antidegradation Standards and Implementation Procedures found in 327 IAC 2-1.3 and an Antidegradation Demonstration is not required.

The technology-based effluent limitations require the permittee to minimize exposure of raw, final, or waste materials to rain, snow, snowmelt, and runoff. In doing so, the permittee is required, to the extent technologically available and economically practicable and achievable, to either locate industrial materials and activities inside or to protect them with storm resistant coverings. In addition, the permittee is required to: (1) use good housekeeping practices to keep exposed areas clean, (2) regularly inspect, test, maintain and repair all industrial equipment and systems to avoid situations that may result in leaks, spills, and other releases of pollutants in stormwater discharges, (3) minimize the potential for leaks, spills and other releases that may be exposed to stormwater and develop plans for effective response to such spills if or when they occur, (4) stabilize exposed area and contain runoff using structural and/or non-structural control measures to minimize onsite erosion and sedimentation, and the resulting discharge of pollutants, (5) divert, infiltrate, reuse, contain or otherwise reduce stormwater runoff, to minimize pollutants in your discharges, (6) enclose or cover storage piles of salt or piles containing salt used for deicing or other commercial or industrial purposes, including maintenance of paved surfaces, (7) train all employees who work in areas where industrial materials or activities are exposed to stormwater, or who are responsible for implementing activities necessary to meet the conditions of this permit (e.g., inspectors, maintenance personnel), including all members of your Pollution Prevention Team, (8) ensure that waste, garbage and floatable debris are not discharged to receiving waters by keeping exposed areas free of such materials or by intercepting them before they are discharged, and (9) minimize generation of dust and off-site tracking of raw, final or waste materials.

To meet the non-numeric effluent limitations in Part I.D.4, the permit requires the permittee to select control measures (including best management practices) to address the selection and design considerations in Part I.D.3. The permittee must control its discharge as necessary to meet applicable water quality standards. It is expected that compliance with the non-numeric effluent limitations and other terms and conditions in this permit will meet this effluent limitation. However, if at any time the permittee, or IDEM, determines that the discharge causes or contributes to an exceedance of applicable water quality standards, the permittee must take corrective actions, and conduct follow-up monitoring.

"Terms and Condition" to Provide Information in a SWPPP
Distinct from the effluent limitation provisions in the permit, the permit requires the discharger to prepare a Stormwater Pollution Prevention Plan (SWPPP) for its facility. The SWPPP is intended to document the selection, design, installation, and implementation (including inspection, maintenance, monitoring, and corrective action) of control measures being used to comply with the effluent limits set forth in Part I.D. of the permit. In general, the SWPPP must be kept up-to-date, and modified whenever necessary to reflect any changes in control measures that were found to be necessary to meet the effluent limitations in this permit.

The requirement to prepare a SWPPP is not an effluent limitation, rather it documents what practices the discharger is implementing to meet the effluent limitations in Part I.D. of the permit. The SWPPP is not an effluent limitation because it does not restrict quantities, rates, and concentrations of constituents which are discharged. Instead, the requirement to develop a SWPPP is a permit "term or condition" authorized under sections 402(a)(2) and 308 of the Act. Section 402(a)(2) states, "[t]he Administrator shall prescribe conditions for [NPDES] permits to assure compliance with the requirements of paragraph (1) of this subsection, including conditions on data and information collection, reporting, and such other requirements as he deems appropriate." The SWPPP requirements set forth in this permit are terms or conditions under the CWA because the discharger is documenting information on how it intends to comply with the effluent limitations (and inspection and evaluation requirements) contained elsewhere in the permit. Thus, the requirement to develop a SWPPP and keep it updated is no different than other information collection conditions, as authorized by section 402(a)(2), in other permits.

It should be noted that EPA has developed a guidance document, "Developing your Storm Water Pollution Prevention Plan – A guide for Industrial Operators (EPA 833-B09-002), February 2009, to assist facilities in developing a SWPPP. The guidance contains worksheets, checklists, and model forms that should assist a facility in developing a SWPPP.

BP captures and treats most of its contaminated stormwater from the refinery area in its WWTP then discharges it through outfall 005. To increase the amount of stormwater that is captured and sent to the WWTP, BP built a new stormwater equalization tank (alternative storage) with a capacity around 11.6 million gallons.

The additional stormwater generated from the new CXHO process units is estimated at 1.5 mgd based on a 3.61in. (24-hr, 5-year) storm event on a net increase of 19 acres. However, for design engineering, a storm event of 5.22 in (24- hour 25- year) of rain is used. As with existing equalization/stormwater tanks, a 10 million gallon tank with an internal roof domed tank.

According to BP there are no circumstances where it be necessary for BP to discharge flows from the equalization tank without sending those flows to the WWTP. BP has never discharged flows from the equalization tank without sending those flows through the WWTP.

All three equalization tanks can be used for storing water if needed. BP should never have to bypass these tanks. There is over 30 million gallons of capacity. BP typically discharges approximately 15-19 million gallons per day of treated water, and they have only one tank in service as equalization.

Public availability of documents

Part I.E.2.d(2) of the permit requires that the permittee retain a copy of the current SWPPP at the facility and it must be immediately available, at the time of an onsite inspection or upon request, to IDEM. Additionally, interested persons can request a copy of the SWPPP through IDEM. By requiring members of the public to request a copy of the SWPPP through IDEM, the Agency is able to provide the permittees with assurance that any Confidential Business Information contained within its SWPPP is not released to the public.

5.8 Water Treatment Additives

In the event that changes are to be made in the use of water treatment additives that could significantly change the nature of, or increase the discharge concentration of the additive contributing to Outfalls 002 or 005 that are greater than the dosage rate identified in the permit application, the permittee shall notify the Indiana Department of Environmental Management as required in Part II.C.1 of this permit. The use of any new or changed water treatment additives or dosage rates shall not cause the discharge from any permitted outfall to exhibit chronic or acute toxicity. Acute and chronic aquatic toxicity information must be provided with any notification regarding any new or changed water treatment additives or dosage rates. The following water treatment additives have been approved for use at the facility:

The following water treatment additives have been approved for use at this facility: 71-D5 PLUS Antifoam, BPB 55715, BPB 59316, BPB 59396, BPB59430, BPB 59455, BPB 59460, BPB 59466, BPB 59470, BPC 60005, BPC 67015, BPC 67280, BPC 67375, BPC 67525, BPC 68160, BPC 68970, BPW 75890, BPW 76030, BPW 76453, CL2OUT1100, Demand Trac 480, Guardion 9405, Phosphoric Acid Solution, Potassium Permanganate, Praestol K122L, Praestol K230FL, Praestol K260FL, Praestol A304OL, Sodium Bisulfite - 40%, Sodium Hypochlorite, 50% sodium hydroxide, Sulfuric acid solution, Hydrochloric acid, Zinc Chloride - 50%, Demand Trac 990, BPB 59396, Y9BH1233, 71D5 Plus Antifoam, Ferric Sulfate, BPB 55715, BPB 59316, ACS 2125, Praestol A3025, Spectrafoc 875, BPW 76001, BPW 76030, BPB 59430, USALCO 38, USALCO GU 55, BPC 68915, BPC 65610

6.0 Permit Draft Discussion

6.1 Discharge Limitations and Monitoring Requirements

DISCHARGE LIMITATIONS
TABLE I
Numeric Discharge Limitations, Sampling, and Monitoring Requirements

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
Parameter	Monthly Average	Daily Maximum	Units	Monthly Average	Daily Maximum	Units	Measurement Frequency	Sample Type
Flow	Report	Report	MGD	----	----	----	Daily	24-Hr. Total
BOD_5	4,161	8,164	lbs/day	Report	Report	mg/l	1 x Weekly	24 Hr. Comp.
TSS	3,646	5,694	lbs/day	Report	Report	mg/l	2 x Weekly	24 Hr. Comp.
COD	30,323	58,427	lbs/day	Report	Report	mg/l	1 x Weekly	24 Hr. Comp.
Oil and Grease	1,368	2,600	lbs/day	Report	Report	mg/l	1 x Weekly	Grab
Phosphorus	Report	Report	lbs/day	1.0	Report	mg/l	1 x Weekly	24 Hr. Comp.
Phenolics (4AAP)	20.33	73.01	lbs/day	Report	Report	mg/l	1 x Weekly	Grab
Ammonia as N	1,030	2.060	lbs/day	Report	Report	mg/l	5 x Weekly	24 Hr. Comp.
Sulfide	23.1	51.4	lbs/day	Report	Report	mg/l	1 x Weekly	24 Hr. Comp.
Total Chromium	23.9	68.53	lbs/day	Report	Report	mg/l	1 x Weekly	24 Hr. Comp.
Hex. Chromium	2.01	4.48	lbs/day	Report	Report	mg/l	1 x Weekly	24 Hr. Comp.
Total Vanadium	50	100	lbs/day	0.28	0.56	mg/l	1 x Monthly	24-Hr. Comp.
Mercury [10][11]								
Final Limits	0.00022	0.00053	lbs/day	1.3	3.2	ng/l	6 x Yearly	Grab
Interim Variance Limits		Annual Average = 23.1			Report	ng/l	6 x Yearly	Grab
Whole Effluent Toxicity								
Chronic	-	-	-	Report	-	TUc	2 x Yearly	
pH	-	-	-	-	[1]	s.u.	3 x Weekly	Grab

[1] The pH of the effluent shall be no less than 6.0 and no greater than 9.0 standard units (s.u.).

Flow

This parameter is required of all NPDES permits and is included in this permit in accordance with 327 IAC 5-2-13(a)(2).

BOD_5, COD, Oil and Grease, Phenolics (4AAP), Total Chromium, Hex. Chromium and Sulfide

The Loading effluent limitations for the above noted parameters have been retained from the previous permit in accordance with 327 IAC 5-2-10(11) commonly referred to as anti-backsliding. BP North America has indicated that it is not necessary to request an increase in the loading effluent limitations for these parameters.

Vanadium

BP has been working on removing the source of Vanadium from their wastewater and was successful in eliminating the main source of Vanadium in December, 2011. The highest measured concentration of Vanadium in Outfall 005 since December, 2011 is 0.031 mg/l which is much smaller than the monthly average effluent limit of 0.28 mg/l. The following update is taken from the schedule of compliance report submitted to IDEM on July 24, 2012 regarding compliance with the final WQBEL for Vanadium contained in the existing permit:

BP completed a detailed source survey of the refinery as well as the evaluation of other refinery vanadium sources and effluent data. This review assisted BP in the evaluation of the need for any additional future controls in addition to the strategies already being planned and implemented as described below. Additionally, BP has contracted Purdue Water Institute and Argonne National Labs to evaluate process design, perform metals speciation and characterization and evaluate various technologies associated with vanadium treatment. BP has also employed the services of third party consultants to assist in the evaluation of potential vanadium treatment technologies as well. However it was determined that additional treatment and controls are not needed with the elimination of the SRU TGU Beavon Stretford blowdown, a major source of vanadium. This will allow BP to comply with the effluent limits for Outfall 005 even with the increased processing of Canadian crudes. This unit is planned to be replaced by second quarter 2013.

The Sulfur Recovery Unit (SRU) Beavon Stretford Solution blowdown accounts for a significant discharge of the existing vanadium loading to BP's wastewater treatment plant. This vanadium-based technology will be replaced with non-vanadium based Shell Claus Off-gas Treatment (SCOT). In the interim, until the SCOT units are completed in 2013, Global Sulfur Solutions will be used to manage impurities in the Stretford solution so that there is no longer needed any blowdown of solution with vanadium to the refinery sewer system and will remove the significant source of vanadium in the effluent. This process has been in place since fourth quarter 2011 and we are now currently meeting the final limits for vanadium.

The Projected Effluent Quality for Vanadium at Outfall 005 since December, 2011, when the Beavon Stretford Solution blowdown containing the source of the Vanadium was discontinued, is the maximum single data point of 0.031 mg/l x the multiplication factor for 7 samples which is 2 = 0.062 mg/l. So the Projected Effluent Quality for Vanadium at Outfall 005 is 0.062 mg/l. The Preliminary Water Quality Based Effluent Limit for Vanadium using the revised Tier II Value for Vanadium is 0.84 mg/l. The Preliminary Effluent Limit (0.84 mg/l) is greater than the Projected Effluent Quality (0.062 mg/l). Therefore based on a preliminary evaluation of the effluent and the recent changes to the source and nature of the discharge, it could be IDEM has concluded that the discharge from Outfall 005 no longer has a reasonable potential to exceed the water quality criteria for Vanadium.

However, because we are only dealing with a limited data set and BP has not completed all of the source reduction changes at the facility, IDEM proposes to retain the existing effluent limits and monitoring requirements for Total Vanadium at Outfall 005 until one year after BP has completed the replacement of the SRU with the SCOT in 2013. BP may then apply for a permit modification at that time to remove the effluent limits and monitoring requirements for Total Vanadium if the

results of a reasonable potential analysis still demonstrate that there is not a reasonable potential to exceed the water quality based effluent limit for Vanadium.

The existing effluent limits are being retained in the permit because BP has demonstrated that they are now able to consistently meet the existing limits for Total Vanadium. The anti-backsliding rules found in 327 IAC 5-2-10(11)(B) prohibit IDEM from relaxing the limits for Total Vanadium based on a revised wasteload allocation. When the source of Total Vanadium has been completely eliminated, the permit may be modified to remove the effluent limits and monitoring requirements for Total Vanadium. The 2007 wasteload allocation for BP was updated to reflect the revised lower effluent design flow of 19.9 MGD. The revised WQBELs for Vanadium were calculated to be:

Monthly Average: 0.73 mg/l and 120 lbs/day
Daily Maximum: 1.5 mg/l and 250 lbs/day

The existing final limits are:

Monthly Average: 0.28 mg/l and 50 lbs/day
Daily Maximum: 0.56 mg/l and 100 lbs/day

One year after the Sulfur Recovery Unit (SRU) Beavon Stretford Solution blowdown (vanadium-based technology) has been replaced with non-vanadium based Shell Claus Off-gas Treatment (SCOT), the permittee may request, in writing, a review of the effluent limits and monitoring requirement for Total Vanadium at Outfall 005.

Mercury

Mercury has been found in the effluent in quantities that show a reasonable potential to exceed water quality standards based on the procedures found in 327 IAC 5-2-11.5. Therefore, the permit will include final effluent limitations for Mercury based on the revised lower effluent design flow of 19.9 MGD. The permit will contain interim effluent limits for Mercury based on the streamlined mercury variance rule (327 IAC 5-3.5). Mercury will be monitored once every two months.

Phosphorus

Phosphorus is added to the wastewater treatment plant as a micro-nutrient. BP has demonstrated that they can consistently achieve a concentration below 1 mg/l and a removal efficiency that averages an estimated 79%. The ability to accurately measure the percent removal efficiency is severely limited, so the requirement to measure the percent removal is being waived. The effluent shall be limited to a monthly average concentration of 1 mg/l in accordance with 327 IAC 5-10-2(a)(2).

Whole Effluent Toxicity

There is not a calculated RPE for WET when there is an alternate mixing zone. BP is required to continue to monitor the effluent from Outfall 001 for Chronic Toxicity. If chronic toxicity is observed by having more than 38 Toxic Units Chronic, then a toxicity reduction evaluation (TRE) will be initiated to determine the cause of the toxicity and to reduce or eliminate the source of the toxicity.

pH

This parameter is required of all NPDES permits and is included in this permit in accordance with 327 IAC 2-1.5-8(c)(2). pH must be maintained between 6 to 9 standard units. The effluent shall be sampled 3 x weekly using a grab sample.

Ammonia as N and Total Suspended Solids

As part of the permit renewal application, BP Products North America, LLC requested that the effluent limits for TSS and Ammonia be decreased to the levels that were included in the permit issued on March 5, 1990 due to material and substantial changes at the refinery that will allow BP to achieve compliance with the previous limits for TSS and ammonia. Since this permit modification does not propose any new or increased discharges, antidegradation is not applicable to this permit modification. The effluent limits for TSS and ammonia from the permit issued to BP on March 5, 1990 will be included in this permit renewal.

Outfall 002

TABLE I
Numeric Discharge Limitations, Sampling, and Monitoring Requirements

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
Parameter	Monthly Average	Daily Maximum	Units	Monthly Average	Daily Maximum	Units	Measurement Frequency	Sample Type
Flow	Report	Report	MGD	----	----	----	Daily	24-Hr. Total
TOC (Intake)	-	-	-	Report	Report	mg/l	1 x Yearly	Grab
TOC (Discharge)	-	-	-	Report	Report	mg/l	1 x Yearly	Grab
TOC (Net)	-	-	-	Report	5.0	mg/l	1 x Yearly	Grab
Total Residual Chlorine	20.0	60.0	lbs/day	0.01	0.02	mg/l	1 x Weekly	Grab
Oil and Grease	-	-	-	Report	5.0	mg/l	1 x Monthly	Grab
Temperature								
Intake	-	-	-	Report	Report	BTU/Hour	5 x Weekly	Hourly
Discharge	-	-	-	Report	Report	BTU/Hour	5 x Weekly	Hourly
Net (daily average)	-	-	-	1.7×10^9	2×10^9	BTU/Hour	5 x Weekly	Hourly
pH	-	-	-	-	[1]	s.u.	3 x Weekly	Grab

[1] The pH of the effluent shall be no less than 6.0 and no greater than 9.0 standard units (s.u.).

Flow

This parameter is required of all NPDES permits and is included in this permit in accordance with 327 IAC 5-2-13(a)(2).

Total Organic Carbon TOC

The limitation for TOC is based on the U.S. EPA effluent guidelines 40 CFR Part 419.43(e) for discharges of once through non-contact cooling water. TOC shall be limited on a net basis in accordance with 327 IAC 5-2-11(f). This limitation is identical to the limitation in the existing permit. This limit has never been exceeded, therefore the monitoring frequency has been reduced to 1 x Yearly which is the minimum monitoring frequency allowed.

Oil and Grease

The requirement to have no oil and grease greater than 5 mg/l is a technology based effluent limit developed in accordance with 327 IAC 5-5-2 recognizing that there should be no oil and grease introduced into the once-through cooling water. This parameter was a net limit in the previous permit but the reported data has established that the intake does not contain any oil and grease which makes the net limit approach unnecessary. The reported data has never shown the presence of oil and grease, therefore the monitoring frequency has been reduced to 1 x Monthly.

Total Residual Chlorine

The water quality based effluent limitation for continuous total residual chlorine is based on the water quality standards in 327 IAC 2-1.5-8, Table 8-1.

The water quality based effluent limits for chlorine are less than the limit of quantitation (LOQ) of 0.06 mg/l. In accordance with 327 IAC 5-2-11.6(h), the permittee will be considered to be in compliance with the WQBELs if the effluent concentrations measured are less than the LOQ of 0.06 mg/l.

Parameter	Test Method	LOD	LOQ
Chlorine	4500-Cl-D	0.02 mg/l	0.06 mg/l
	4500-Cl-E	0.02 mg/l	0.06 mg/l
	4500-Cl-G	0.02 mg/l	0.06 mg/l

Case-Specific LOD/LOQ

The permittee may determine a case-specific LOD or LOQ using the analytical method specified above, or any other test method which is approved by the Commissioner prior to use. The LOD shall be derived by the procedure specified for method detection limits contained in 40 CFR Part 136, Appendix B, and the LOQ shall be set equal to 3.18 times the LOD. Other methods may be used if first approved by the Commissioner. BP has submitted their procedure/program for minimizing the amount of chlorine being discharged, therefore the requirement to submit a pollutant minimization program will not be included in the permit.

Temperature

The NPDES permit for BP contains alternate thermal effluent limits established in accordance with 327 IAC 5-7 and Section 316(a) of the Clean Water Act. The alternate limits of a net daily average of 1.7 million BTU/Hour and a net daily average maximum of 2.0 million BTUs/ Hour were developed as a part of the 316(a) approval given to the previous owner of this facility (Amoco Oil Company) on June 16, 1975 by the U.S. EPA. The alternate limits were continued in the permit renewals that occurred prior to this renewal with the last renewal occurring on July 30, 2007. Those renewals were based on the initial 316a study and the fact that no harm to aquatic life has been documented due to the thermal discharge from Outfall 002 since the discharge began operations. The net temperature is calculated by subtracting the temperature value of the intake water from the temperature value of the gross discharge every hour and averaging those values over the 24 hours of each day when sampling occurs.

During the term of the existing NPDES permit issued on July 30, 2007, BP North America, LLC worked with IDEM to develop and conduct an IDEM approved thermal impact study and then submit the results of that study to IDEM to demonstrate that the alternative effluent limitations (existing alternate limits) desired by the discharger, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, will assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is to be made.

A Type III §316(a) Demonstration (US Environmental Protection Agency [EPA] 1977) was conducted for the Whiting Refinery (then owned by Amoco Oil Company and Union

Carbide Corporation in 1975) (Limnetics 1975). The Limnetics study included plume mapping data collected in 1971-1973 and biological data collected from several power plants in the southern portion of the lake during the same time frame. Limnetics (1975, p. 115) concluded that the thermal effluents from this Refinery "are not expected to appreciably harm the indigenous population of fish, shellfish and associated wildlife." IDEM accepted the demonstration and EPA Region V concurred stating "we have no objections to the State of Indiana granting Amoco's request for alternative thermal effluent limits" (letter from James McDonald, Director, Region V EPA to IDEM dated June 16, 1975).

The current NPDES permit (IN0000108) required that a thermal monitoring/modeling study be conducted, which was completed in 2010 (AECOM 2011). Consistent with a Study Plan approved by IDEM, BP conducted a four-week long field survey in the receiving water near Outfall 002 from September 23 to October 27, 2010.

Results of model scenario runs indicate that the thermal plume extends beyond the 1,000-foot arc encircling the outfall under worst-case scenarios. The proposed future plant conditions with reduced volumes of cooling water discharge are not expected to have any significant impacts on the extent of the thermal plume. The extent of the thermal plume is greatest when wind is from the north and the ambient current direction is towards the southeast.

Based on the thermal plume study results, a §316(a) variance demonstration based on a site-specific biological assessment was determined to be warranted. Section IIIA of the NPDES Permit requires that BP conduct a §316(a) study to justify continuation of the previously approved temperature variance. As conditioned in the permit, BP prepared a study plan for review and approval by IDEM, conducted the approved study, and, within 24 months of approval of the study plan, submitted this §316(a) variance request to IDEM.

Prior to submittal of the biological study plan, IDEM staff were consulted on several occasions to get their input regarding study design. It was agreed that the study should be conducted primarily during the summer and that fish are the only taxonomic group that need to be monitored. It was further agreed that fish near shore would be sampled by electrofishing and those offshore by trawling and gill netting. On May 27, 2011, BP sent an initial draft of the Study Plan to IDEM for review. On June 10, 2011, IDEM requested a number of changes including taking considerably more physicochemical measurements, requesting additional biological metrics, repositioning of two sampling locations, and adding one more offshore location. On July 5, 2011, BP sent a revised study plan to IDEM that addressed the various concerns that IDEM had raised in its letter dated June 10, 2011. BP modified the draft study plan to address IDEM recommendations and IDEM approved the revised study plan on July 8, 2011.

According to Indiana water temperature criteria for Lake Michigan [327 IAC 2-1.5-8(c)], the receiving water temperature cannot be more than 3°F (1.7°C) greater than existing background temperature at a maximum distance of a 1,000-ft arc inscribed from the thermal discharge. Under Indiana water quality criteria, water within the arc can exceed the standard

without a thermal variance under §316(a). In addition, the receiving water temperature outside of the 1,000-ft arc cannot exceed specified monthly temperatures in Lake Michigan (Table 1-2), except when an exceedance can be demonstrated to be caused by the water temperature at the intake.

The following water quality standards are applicable to a discharge to Lake Michigan:

At any time and at a maximum distance of a one thousand (1,000) foot arc inscribed from a fixed point adjacent to the discharge or as agreed upon by the commissioner and federal regulatory agencies, the following shall apply:

(i) Thermal discharges to Lake Michigan shall not raise the maximum temperature in the receiving water above those listed in the following table, except to the extent the permittee adequately demonstrates that the exceedance is caused by the water temperature of the intake water:

Table 1-2

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
ºF	45	45	45	55	60	70	80	80	80	65	60	50

(ii) If the permittee demonstrates that the intake water temperature is within three (3) degrees Fahrenheit below an applicable maximum temperature under subitem (i) above, then not more than a three (3) degree Fahrenheit exceedance of the maximum water temperature shall be permitted.

According to the approved thermal plume study plan, BP conducted a four-week field survey in the receiving water near Outfall 002 from September 23 to October 27, 2010. The Environmental Fluid Dynamics Code (EFDC) model was used to develop the thermal model due to the complex hydrodynamics of the BP Whiting thermal discharge, the resulting plume, and the need to evaluate the thermal plume in three dimensions. The EFDC model was calibrated using the first two weeks of field survey data from September 27, 2010 to October 11, 2010. The calibrated model was then validated using the second two weeks of field survey data from October 11, 2010 to October 25, 2010. Comparison of predicted data and observed data from the validation period indicated that the model calibration was satisfactory based on the United States Environmental Protection Agency technical guidance (USEPA 1990) and professional judgment, and that the model is suitable for predictions outside of the calibration period and for predictions at multiple locations within the model domain.

The calibrated and validated model was used to predict the extent of the thermal plume under a range of worst-case heat dissipation scenarios. The results of model scenario runs indicated that the thermal plume extends beyond the 1,000-ft arc encircling the outfall under worst-case scenarios. The proposed future plant conditions are not expected to have any

significant impacts on the extent of the thermal plume. The extent of the thermal plume is greatest when wind is from the north and ambient currents are towards the southeast.

IDEM has reviewed the results of the Thermal Impact Study and the application for alternate thermal effluent limits in accordance with 327 IAC 5-7 and IDEM proposes to allow BP Products North America to continue using the existing alternate thermal effluent limitations at Outfall 002 because IDEM believes that the alternate effluent limitations will ensure the protection and propagation of the balanced and indigenous population of fish, shellfish and wildlife in and on the water body.

pH

This parameter is required of all NPDES permits and is included in this permit in accordance with 327 IAC 2-1.5-8(c)(2). pH must be maintained between 6 to 9 standard units. The effluent shall be sampled 3 x weekly using a grab sample.

Zebra Mussel Control

The zebra mussel control program is used for the purpose of killing both adult and juvenile Quagga and Zebra mussels in the refinery once through cooling water system (OTCW). This kill is accomplished by a continuous feed of sodium hypochlorite throughout the year; spring, summer, fall, and winter. Sodium hypochlorite feed will be controlled to maintain 0.25 – 0.5 mg/l total residual chlorine (TRC). De-chlorination will occur using Sodium Bi-sulfite prior to discharge.

Section 316(b) Cooling Water Intake Structure (CWIS) Requirements

Introduction

The U.S. Environmental Protection Agency (EPA) requires the permit issuing authority to conduct a best professional judgment (BPJ) evaluation of the CWIS to establish that the CWIS is equivalent to the best technology available (BTA). Therefore, the BP Whiting Business Unit (WBU) provided IDEM a description of the CWIS dated 29 August 2012.

Cooling Water Intake Structures Descriptions

Lake Michigan is the water source for both water stations. At the present time, there are two water intakes located approximately 1,330 and 1,440 feet offshore, about 300 feet apart. Although grating exists on the intake system to exclude large debris, no intake screen system exists.

One water intake supplies water to the 1911 tunnel; the other intake supplies water to the 1942 tunnel. These tunnels are tied together near the water stations, so that both tunnels serve both water stations. Although each water station can be isolated for maintenance, the current configuration does not allow either tunnel intake to be isolated. The tunnels terminate in the suction well located below the floor of each station. All pumps in each station take suction from the station well.

1911 Tunnel and Cooling Water Intake Structure

In 1911 a brick tunnel was constructed into Lake Michigan and connected to the "old" pumping station. The inside dimensions of the brick tunnel are 5 feet 0 inches wide by 5 feet 6 inches high; while the wall thickness data is not known. The length of this tunnel is 2,400 feet from the lake intake to the land shaft located adjacent to the tunnel flush tank. (A land shaft is used during the construction of a tunnel.) This tunnel is still in operation and is connected to the tunnel constructed in 1942 and to the two water stations.

Details of the water intake structure to the 1911 tunnel are not as clear. The intake was originally designed with what appear to be three arms capped with cylindrical screens which fed into a central pipe 8 feet 4 inches in diameter. Over time, modifications have been made to maintain the intake structure in operable condition, but much of the original structure remains intact. One of the screened arms is no longer present and the central pipe is now an open pipe receiving vertical water flow. This intake provides a small proportion of the total design intake flow and is located approximately 1,330 feet offshore.

1929 Flume

The No. 1 Water Station was constructed in 1929. A reinforced concrete tunnel, sometimes called a "flume", also was constructed to connect the land shaft of the 1911 tunnel with the suction well of the No. 1 Water Station. There is a gate well and a sluice gate (manual or electric motor operated) inside No. 1 Water Station to block off the water supply for necessary repairs inside the suction well of No. 1Water Station. This will not bypass the 1911 intake as flow will continue to No. 2 Water Station.

1942 Tunnel and Intake

The No.2 Water Station was constructed in 1942. Also constructed at this time was a second tunnel into the lake. The length of this tunnel is 2530 feet from its water intake to the 10 feet 0 inch inner diameter reinforced concrete land shaft located northwest of No. 1 Water Station. A gate well (but no sluice gate) is located in this tunnel section. There is a gate well and manually operated sluice gates to block off this tunnel for necessary repairs inside the suction well of No. 2 Water Station.

In the early 1980s, a frazzle ice and biological fouling prevention system was put in place. Hot water and chlorine solution are pumped out to manifolds running the circumference of the intake in order to reduce ice and biological growth. This intake provides the majority of the total design intake flow and is located approximately 1,440 feet offshore.

WATER STATION DESCRIPTION AND OPERATION

Water Station Nos. 1 and 2 receive water via both intake tunnels to a wet well located under each water station. All pumps in each station take suction from the station well. No. 1 Water Station houses five pumps (including one smaller firewater pump) with a design capacity of 117.8 million gallons per day (MGD). One pump was removed, but equipment is still in place for it to be re-installed to satisfy future needs. No.2 Water Station houses four pumps with a design capacity of 146.3 MGD. A recent upgrade to the firewater system included a new pump house for three

firewater pumps with a design capacity of 17.3 MGD. This pump house's suction well is tied into the land shaft. The four firewater pumps in No. 1 Water Station and the new firewater pump house operate on demand and are not often in use. The capacity of all three pump houses combined is 281.4 MGD

Pumps are generally operated by maintaining a pressure of approximately 34 to 35 psig in the main header and the number and combination of pumps turned on at a given time depends on refinery water demand. Therefore, the actual flow at individual pumps or water stations is variable. Flow meters are located at the Lakefront Waste Water Treatment Plant to measure discharge to the lake. Water intake values are, therefore, back-calculated, incorporating losses incurred within the refinery. The calculated total average intake flow from 2009 to 2011 was 91.9 MGD. A theoretical analysis of intake tunnel volumes and frictional impacts estimated that 67 percent of the total water intake flows through the 1942 tunnel and 33 percent through the 1911 tunnel. Estimated flows for the 1942 and 1911 tunnels based on this percentage split are shown in Table 1:

TABLE 1
AVERAGE ACTUAL INTAKE FLOW FROM 2009-2011

Time Period	Intake 1942 Flow	Intake 1911 Flow	Combined Flow
2009	67.4	33.1	100.5
2010	61.8	30.3	92.1
2011	55.9	27.4	83.3
2009-2011	61.7	30.3	92.0

AVERAGE THROUGH-SCREEN VELOCITY

Average through-screen velocity was measured on November 13, 2009, during a routine intake inspection. Divers used a hand-held velocity meter and positioned it along the intake plane at specified locations, orienting the meter until the greatest velocity at each location was observed. Fifteen locations were measured at the 1942 intake and one measurement was taken at the 1911 intake. Average intake flow on November 13 was calculated at approximately 85 MGD. During the period when the diver was taking velocity measurements, pumps were operated at 35 psig to simulate high refinery water demand and increased intake water velocities. The average velocity observed at the 1942 intake was 0.26 feet per second (fps) with a maximum velocity of 0.35 fps. The single velocity measurement for the 1911 intake was made at the center of the intake pipe and had a value of 0.56 fps. This location is likely the maximum velocity of the intake pipe velocity field and the average velocity would therefore be less than this value.

The number of pumps and design capacities were provided in the 29 August 2012 CWIS Documentation. Water enters each pump house from two offshore intake tunnels to a pump house suction well. Pumps draw water from the well for distribution throughout the refinery as well as supply to other users such as Whiting Clean Energy, Praxair, Ineos Chemical and previously the City of Whiting. The following table No. 1 provides additional information on the intakes:

Table No. 1. Water Station Information

Intake Characteristic	Water Station No. 1	Water Station No. 2	Firewater Pump House
Number of debris/fish screens	0	0	0
Number of water pumps	5	4	3
Pump capacity (design)	117.8 MGD	146.3 MGD	13.0 MGD
Intake supplier	Both 1942 and 1911 offshore intakes	Both 1942 and 1911 offshore intakes	Both 1942 and 1911 offshore intakes
Supplied Operation	BP Refinery (process/utility water and once through cooling water, City of Whiting (until 2010), Whiting Clean Energy, Ineos Chemical (until end 2012) and Praxair	BP Refinery (process/utility water and once through cooling water, City of Whiting (until 2010), Whiting Clean Energy, Ineos Chemical (until end 2012) and Praxair	BP Refinery fire water system

(B) There are no dedicated debris screens or fish returns at the pump houses or intakes. Debris screening is achieved at the individual process unit standard pump screens. When the proposed 316(b) Rule is finalized, BP will assess the new regulation requirements, the current intake configuration, and options to remain compliant and protective of the environment. EPA and IDEM have previously determined, taking into account the current configuration, that the CWIS is protective of the environment in accordance with the current 316 (b) requirements.

(C) There are six cooling towers in operation within the refinery. Installation of two additional cooling towers is included in the Whiting Refinery Modernization Project (WRMP). The cooling towers and unit re-configurations of the plant upgrade project are expected to achieve water demand reductions estimated at 16.9 MGD. Though new circulating systems are being installed and evaluated, replacing the entire system with circulating systems is not practicable. Upon finalization of the 316(b) Rule and completion and startup of WRMP, BP will evaluate water reductions provided by the cooling towers and other process reconfigurations and how those reductions might help the Whiting facility to comply with 316(b) requirements.

(D) The monthly average daily Actual Intake Flow (AIF) is calculated by averaging the daily flows for the days in the month and is provided as a daily average flow rate, summarized below for Years 2009 to 2011, along with the daily design flow.

Design vs. Actual Intake Flow

Month/Year	Monthly Intake Flow (MGD)	
	Design Intake Flow	Calculated Actual Intake
Jan 2009	277.1	102.3
Feb		108.5
Mar		105.0
Apr		95.7
May		95.6
Jun		103.2
Jul		108.5
Aug		107.9
Sep		104.7
Oct		96.5
Nov		89.6
Dec		87.7
2009 Annual	--	**100.5**
Jan 2010	277.1	86.0
Feb		83.0
Mar		84.0
Apr		88.8
May		91.1
Jun		97.4
Jul		104.5
Aug		106.1
Sep		100.8
Oct		93.5
Nov		86.3
Dec		83.1
2010 Annual	--	**92.1**
Jan 2011	277.1	72.5
Feb		72.0
Mar		58.5
Apr		65.8
May		72.0
Jun		93.1
Jul		93.6
Aug		80.7
Sep		114.8
	Monthly Intake Flow (MGD)	

Month/Year	Design Intake Flow	Calculated Actual Intake
Oct	277.1	101.1
Nov		86.2
Dec		89.1
2011 Annual	**--**	**83.3**

(E) Intake flow is calculated from the discharge of the Lakefront Waste Water Treatment Plant, consumptive use, and water losses that occur within the refinery. Therefore, there is no flow data that can be directly associated with the instantaneous velocity measurements taken at the intake and the 35 psig header pressure. However, as stated in the documentation, the average intake flow calculated for the day of the velocity measurements was 85 MGD.

(F) BP has a water intake and usage registration with the Indiana Department of Natural Resources. BP recognizes that its average cooling water flow needs do not approach DIF conditions. However, until the 316(b) Rule is finalized, BP believes it is premature to commit to any permitted flow reductions at this facility, especially if evaporative losses (consumptive losses) are capped due to the Great Lakes Compact. Monthly calculated intake flows are reported each month and total annual flows are reported to the Indiana Department of Natural Resources (DNR). The DNR is the authority for the state of Indiana responsible for the registration of the intake capacities and allowed withdrawals from the Great Lakes.

Conclusion and Permit Conditions

Based on available information; IDEM has made a Best Technology Available (BTA) determination that the existing cooling water intake structures represent best technology available to minimize adverse environmental impact in accordance with Section 316(b) of the federal Clean Water Act (33 U.S.C. section 1326) at this time based on the following information:

- Average through-screen velocity was measured on November 13, 2009, during a routine intake inspection. The average velocity observed at the 1942 intake was 0.26 feet per second (fps) with a maximum velocity of 0.35 fps. The single velocity measurement for the 1911 intake was made at the center of the intake pipe and had a value of 0.56 fps. This location is likely the maximum velocity of the intake pipe velocity field and the average velocity would therefore be less than this value.
- The capacity of all three pump houses that supply water combined to BP is 281.4 MGD and the 2011 annual average water intake rate is 83.3 MGD. The water intake rate over the past several years is in decline due to improvements and recycling efforts at the refinery: 2009 annual average water intake rate = 100.5 MGD; 2010 annual average water intake rate = 92.1 MGD. The 2011 annual average water intake rate is approximately 30 % of the pumping capacity.
- There are six cooling towers in operation within the refinery. Installation of two additional cooling towers is included in the Whiting Refinery Modernization Project (WRMP). The cooling towers and unit re-configurations of the plant upgrade project are expected to achieve water demand reductions estimated at 16.9 MGD.

- BP has a water intake and usage registration with the Indiana Department of Natural Resources. Monthly calculated intake flows are reported each month and total annual flows are reported to the Indiana Department of Natural Resources (DNR). The DNR is the authority for the state of Indiana responsible for the registration of the intake capacities and allowed withdrawals from the Great Lakes.
- The DNR is also responsible for the implementation of the Great Lakes Initiative which regulates the amount of withdrawal, consumption and diversions of the Indiana portion of the Great Lakes. Consumptive losses as well as diversions and design withdraw capacities are capped by the DNR registration.

This determination is based on Best Professional Judgment (BPJ) and will be reassessed at the next permit reissuance to ensure that the CWISs continue to meet the requirements of Section 316(b) of the federal Clean Water Act (33 U.S.C. section 1326). IDEM believes that, for reassessment of its BTA determination during the next permit renewal, fish return alternatives must be evaluated during the term of this permit renewal. The permittee shall comply with the following requirements in the renewed permit:

1. At all times properly operate and maintain the cooling water intake structure equipment.

2. The permittee shall submit a fish impingement and mortality minimization alternatives evaluation and implementation plan to IDEM for review and approval. The evaluation report and implementation plan for any operational changes and/or facility modification shall be submitted to IDEM as soon as feasible, but at least 270 days prior to the expiration date of this permit. The fish mortality minimization alternatives evaluation shall include the feasibility of installing a fish return to Lake Michigan.

3. Inform IDEM of any proposed changes to the CWIS or proposed changes to operations at the facility that affect the information taken into account in the current BTA evaluation.

4. Submit all required reports to the IDEM, Office of Water Quality, Permits Branch

Outfalls 003 and 004

TABLE I
Numeric Discharge Limitations, Sampling, and Monitoring Requirements

	Quantity or Loading			Quality or Concentration			Monitoring Requirements	
Parameter	Monthly Average	Daily Maximum	Units	Monthly Average	Daily Maximum	Units	Measurement Frequency	Sample Type
Flow	Report	Report	MGD	----	----	----	Daily	24-Hr. Total
TOC	-	-	-	Report	110	mg/l	1 x Weekly	Grab
Oil and Grease	-	-	-	Report	15	mg/l	1 x Weekly	Grab
pH	-	-	-	-	[1]	s.u.	1 x Weekly	Grab

[1] The pH of the effluent shall be no less than 6.0 and no greater than 9.0 standard units (s.u.).

Flow

This parameter is required of all NPDES permits and is included in this permit in accordance with 327 IAC 5-2-13(a)(2).

TOC

The effluent limitations for TOC are based on 40 CFR Part 419.43(f) for contaminated runoff.

Oil and Grease

The previous fact sheet stated that the effluent limits for Oil and Grease are based on Indiana Water Quality Standards. The daily maximum limit of 15 mg/l is also equivalent to the technology-based effluent limitation for oil and grease developed in accordance with 327 IAC 5-5-2 representing the permit writer's best professional judgment of the best available treatment.

pH

This parameter is required of all NPDES permits and is included in this permit in accordance with 327 IAC 2-1.5-8(c)(2). pH must be maintained between 6 to 9 standard units. The effluent shall be sampled 1 x weekly using a grab sample.

6.2 Schedule of Compliance

The circumstances in this NPDES permit do not qualify for a schedule of compliance.

6.3 Special Conditions

Streamlined Mercury Variance (SMV)

Introduction

The permittee submitted a renewal application for a streamlined mercury variance (SMV) on February 6, 2012 in accordance with the provisions of 327 IAC 5-3.5. The SMV establishes a streamlined process for obtaining a variance from a water quality criterion used to establish a WQBEL for mercury in an NPDES permit.

IDEM has conducted a review of the SMV goals contained in the existing permit to determine if BP has achieved those goals in accordance with the permit conditions based on the SMV. IDEM has determined the application to be complete as outlined in 327 IAC 5-3.5-4(e).

BP submitted an SMV progress report to IDEM on August 17, 2012 to satisfy goal No. 1 of the SMV. The progress report contained the following summary of the research conducted by Purdue Uniuversity and Argonne National Laboratory. Purdue University Calumet (Purdue or PUC) and Argonne National Laboratory (Argonne) have conducted an independent multi-year study, funded by BP, to identify deployable technologies to treat (refinery) wastewater with the objective of meeting the 1.3 ng/1 (ppt) Great Lakes Water Quality Criterion for mercury. The final phase, pilot-scale study was conducted at the BP Whiting refinery using a slipstream of wastewater taken just prior to the Effluent to the Lake (pre - ETL) outfall as the influent stream to the pilot. The pilot-scale testing plan involved ultrafiltration and reactive filtration (Blue PRO®) technologies.

Key findings from this phase included:

- The mercury in the feed to the unit was primarily associated with particulates - very little dissolved mercury was measured during the test period.

- Significant variability in mercury concentrations was observed during this study. To obtain a measure of variability, two days of composite sampling events for the ultrafiltration pilot were conducted. These two sampling events showed that the standard deviations were very high and ranged from 41.5 to 59% in feed and membrane backwash samples

Ultrafiltration Pilot Study:

- The UF membrane pilot unit consistently provided permeate that was less than 0.5 ppt total mercury.

- Low membrane fouling rates were calculated during a majority of the study duration, except for one (unexplained) episode of high fouling rate.

- An unexpectedly large solids accumulation was noticed in the membrane unit at the conclusion of the pilot in spite of the regular maintenance and chemical cleanings. However,

accumulation of mercury on the membrane fibers themselves was negligible and did not appear to affect performance.

- The separated mercury concentrated in a reject stream that is still fairly substantial as a percentage of the feed flow. Further testing is therefore needed to determine treatment options for the full scale reject stream.

Reactive Filtration Pilot Study:

- The reactive filtration unit was first operated as a sand filter only mode (without ferric or Nalmet® 1689 polymer addition). Mercury breakthrough was seen in the effluent after 46 days of operation in this mode.

- Bench-scale testing had previously determined that Nalmet® polymer addition was preferable to ferric addition in case sand filtration alone was not sufficient to meet the treatment criterion. Effluent quality, after Hg breakthrough mentioned above, was restored when Nalmet® (at a very high dosage of 25 ppm to each filter) was added to each filter's influent, however, the brevity of these test conditions (three weeks) prevent definitive conclusions from being made regarding long term effectiveness of this approach.

- Mercury accumulation was seen in the filter during both modes of operation. It appeared that this accumulation was enhanced during Nalmet® addition, to the extent that all of the separated mercury appeared to be accumulating in the sand during the Nalmet® addition rather than being concentrated into the reject stream. The capacity of the filter to accumulate mercury before effluent mercury quality is impacted is unknown.

- Further testing is necessary to determine the treatment options for the reject flow from this unit, which contains the concentrated mercury, as well as options to deal with mercury accumulation in the sand bed.

Recommendations by Purdue and Argonne for Further Evaluation Steps

The following are the key recommendations from the Purdue Argonne team for further evaluations:

- Both Purdue and Argonne recommend a longer-term pilot study of ultrafiltration technology at the Whiting refinery. Purdue recommends that the chronological change of the Hg on the used ultrafiltration membrane fibers be monitored. The Hg content of the used membrane fibers is not a concern to Argonne since the total Hg accumulation is minimal based on the overall mass balance calculations on the membrane fibers.

- Argonne does not recommend further pilot testing of the Blue PRO® process until the Hg accumulation in the sand issue is better understood. Argonne recommends that long term testing of the alternative option developed by Argonne, namely, Nalmet® addition prior to the existing sand filters, be conducted prior to any long term Blue PRO® testing. Purdue recommends that if the Blue PRO® process is further considered, long term testing of the Blue PRO® process with Nalmet® addition is needed to determine whether Hg breakthrough would occur.

- Both Purdue and Argonne have concluded that further testing is needed to determine options for appropriate disposal of the ultrafiltration reject, or the backwash from either the Blue PRO® process or the sand filters with Nalmet® addition, which contains concentrated levels of Hg.

- The variability exhibited by samples has been identified as a concern. Argonne suggests that future pilot work should consider the use of grab samples for the rapid preliminary assessment of pilot performance and that these grab samples be supplemented with the use of composite sampling in order to obtain more representative samples and improved process analysis.

- Argonne and Purdue have some operational concerns with pilot unit availability and reliability. The impacts from these are recommended to be closely monitored during further testing.

BP's Next Steps of Evaluation:

Based on these recommendations, and a detailed review of the Purdue Argonne reports, BP proposes the following activities during the next phase of the evaluation:

Both Purdue and Argonne recommend a longer term pilot of ultrafiltration technology. Consistent with the requirements of our permit, BP Whiting will commence a pilot demonstration unit to further review the ultrafiltration (or similar) technology. Operation of the pilot demonstration unit of similar size as the Purdue/Argonne pilot will begin by
August 1, 2013. Completion of the pilot demonstration and submission of the final report to IDEM will occur by March 1, 2015. The pilot demonstration evaluation will include the following:

- Because sampling variability has been identified as a significant issue, a longer duration sampling plan with composite and grab samples will be developed and implemented to further evaluate mercury speciation and representativeness in the pilot feed and effluent.

- The evaluation of options for the treatment and disposal of the reject stream will be integrated into the testing plan.

- Performance under varying weather and process conditions as well as reliability operability, and feasibility will be reviewed. The report to IDEM will summarize the results of the pilot demonstration including reliability and feasibility and further recommendations.

Both Purdue and Argonne recommend further evaluation of chemical additive effects with sand filtration. Argonne recommends reviewing these effects before any long term pilot study is implemented for the Blue PRO® reactive filtration technology. In addition BP will evaluate effects of the new Brine Treatment Unit planned to be on line in first quarter 2013 in combination with the new final sand filters to determine any additional mercury removal. Completion of the evaluation and submission of the final report to IDEM will occur by March 1, 2015.

- Evaluation of the effectiveness of the Brine Treatment Unit and the new sand filters in removing mercury will be performed in 2013-2014. Additional benefits from the usage,

optimization of dosage, and potential side issues (e.g. toxicity) from the use of precipitants such as Nalmet® 1689 will be evaluated. Mercury accumulation in the sand filters, as well as capacity before breakthrough, will be monitored and options for the treatment of the backwash stream will also be evaluated.

• Performance under varying weather and process conditions as well as reliability operability, and feasibility will be reviewed. The report to IDEM will summarize the results of the study including reliability and feasibility and further recommendations.

Term of SMV

The SMV and the interim discharge limit included in Part I.A.1., Discharge limitations Table, will remain in effect until the NPDES permit expires under IC 13-14-8-9 (amended under SEA 620, May 2005). Pursuant to IC 13-14-8-9(d), when the NPDES permit is extended under IC 13-15-3-6 (administratively extended), the SMV will remain in effect as long as the NPDES permit requirements affected by the SMV are in effect.

Annual Reports

The annual report is a condition of the Pollutant Minimization Program Plan (PMPP) requirements of 327 IAC 5-3.5-9(a)(8). The annual report must describe the permittee's progress toward fulfilling each PMPP requirement, the results of all mercury monitoring within the previous year, and the steps taken to implement the planned activities outlined under the PMPP. The annual report may also include documentation of chemical and equipment replacements, staff education programs, and other initiatives regarding mercury awareness or reductions. The complete inventory and complete evaluation required by the PMPP may be submitted as part of the annual report. The permittee will submit the annual reports to IDEM on the anniversary of the effective date of this NPDES permit renewal.

SMV Renewal

As authorized under 327 IAC 5-3.5-7(a)(1), the permittee may apply for the renewal of an SMV at any time within 180 days prior to the expiration of the NPDES permit. In accordance with 327 IAC 5-3.5-7(c), an application for renewal of the SMV must contain the following:

- All information required for an initial SMV application under 327 IAC 5-3.5-4, including revisions to the PMPP, if applicable.
- A report on implementation of each provision of the PMPP.
- An analysis of the mercury concentrations determined through sampling at the facility's locations that have mercury monitoring requirements in the NPDES permit for the two (2) year period prior to the SMV renewal application.
- A proposed alternative mercury discharge limit, if appropriate, to be evaluated by the department according to 327 IAC 5-3.5-8(b) based on the most recent two (2) years of representative sampling information from the facility.

Renewal of the SMV is subject to a demonstration showing that PMPP implementation has achieved progress toward the goal of reducing mercury from the discharge. BP has met all of

the PMPP requirements up to this point and they are scheduled to begin operation of such pilot demonstration unit of similar size as the Purdue/Argonne pilot within eighteen (18) months of the NPDES permit modification incorporating the SMV (August 17, 2013). The effluent characteristics still indicate that the concentration of Mercury in individual samples taken of the effluent from Outfall 005 has exceeded the annual average value of 23.1 ng/l. Therefore, the existing variance limit of 23.1 ng/l will be retained in this permit renewal.

Pollutant Minimization Program Plan (PMPP)

The PMPP is a requirement of the SMV application and is defined in 327 IAC 5-3.5-3(4) as the plan for development and implementation of Pollutant Minimization Program (PMP). The PMPP is defined in 327 IAC 5-3.5-3(3) as the program developed by an SMV applicant to identify and minimize the discharge of mercury into the environment. PMPP requirements (including the enforceable parts of the PMPP) are outlined in 327 IAC 5-3.5-9. In accordance with 327 IAC 5-3.5-6, the permittee's PMPP is hereby incorporated within this permit below:

1. Within 6 months from the effective date of the permit modification to incorporate the SMV requirements (Due date of August 17, 2012), BP will conduct a review of the reports from the Purdue/Argonne pilot study conducted at the Whiting Refinery and submit a report to IDEM summarizing recommendations for further evaluation steps to reduce the discharge of Mercury from the Whiting Refinery. *This requirement has been achieved by BP.*

   If a particular mercury removal technology is recommended for an additional pilot demonstration after completion of the Purdue/Argonne pilot studies conducted at the Whiting Refinery, BP Whiting would commence a pilot demonstration unit to further review the recommended technology(ies) according to the following schedule:

   a. Begin operation of such pilot demonstration unit of similar size as the Purdue/Argonne pilot within eighteen (18) months of the NPDES permit modification incorporating the SMV (August 17, 2013).

   b. Complete the pilot demonstration and submit a final report to IDEM within thirty-six (36) months of the NPDES permit modification incorporating the SMV (February 17, 2015).

      The pilot demonstration evaluation will include at least the following: performance under varying weather and process conditions, evaluation of options for waste streams, and reliability, operability, and feasibility. The report to IDEM shall summarize the results of the pilot demonstration, including reliability and feasibility of the piloted mercury removal technology, and recommendations for the next phase of review.

2. Within 18 months from the start up of the Brine Treatment Unit and Final Filters, BP will complete an evaluation of the mercury reduction of the new Brine Treatment unit and final filters being installed at the Whiting Refinery and submit a final report to IDEM. The evaluation will include at least the following: performance under varying weather and process conditions, evaluation of option for waste streams, and reliability, operability

and feasibility. The report to IDEM shall summarize the results of the evaluation, including reliability and feasibility of the mercury removal, and recommendation for the next phase of the review

3. Within 6 months from the effective date of the permit modification to incorporate the SMV requirements (August 17, 2012), BP will review the existing purchasing policies and practices to ensure the disclosure of mercury content as part of the purchasing criteria. BP will complete and document the review of the existing procedures and develop any new language required to incorporate the objective of restricting the purchase and use of mercury containing chemicals and equipment where there is a risk of contributing mercury to the wastewater discharge.

4. Within 12 months from the effective date of the permit modification to incorporate the SMV requirements (February 17, 2013), BP will educate all BP Whiting Refinery personnel about the mercury related purchasing policies, recycling practices, proper handling and disposal techniques, spill containment procedures, and other pollution prevention measures designed to reduce the potential for mercury to enter the wastewater treatment plant. BP will develop a computer-based training module or Virtual Training Administrator (VTA) or other training methods as appropriate for the training of personnel.

5. Within 12 months from the effective date of the permit modification to incorporate the SMV requirements (February 17, 2013), BP will review the current recycling program for opportunities and improvements for the mercury containing equipment and update the practices and procedures to incorporate these opportunities as needed and as feasible.

6. Within 18 months from the effective date of the permit modification to incorporate the SMV requirements (August 17, 2013), BP will complete the review and identification of mercury containing chemicals or additives that are used in the operations and processes which have the potential risk of entering the process wastewater sewer system.

7. Within 18 months from the effective date of the permit modification to incorporate the SMV requirements (August 17, 2013), BP will compile a complete inventory of all equipment containing mercury that have the potential risk of charging mercury to the process wastewater sewer system, including the estimated mercury content from the vendor and supplier information as well as location of such equipment.

8. Within 24 months from the effective date of the permit modification to incorporate the SMV requirements (February 17, 2014), BP will perform an assessment of the mercury content of the sediment in the main process sewer legs that are part of the current sewer cleaning program.

9. Within 24 months from the effective date of the permit modification to incorporate the SMV requirements (February 17, 2014), BP will complete an assessment of identified process unit wastewater discharges from sources within the refinery that may contain mercury at detection levels utilizing process knowledge, previous analysis or with new analysis if warranted.

10. Within 24 months from the effective date of the permit modification to incorporate the SMV requirements (February 17, 2014), BP will develop a prioritized schedule for the cleaning of the sewers incorporating any significant impacts found from the results of the sewer system characterization study. The sediment and mercury removal progress will be reported in the annual reports.

11. Within 36 months from the effective date of the permit modification to incorporate the SMV requirements (February 17, 2015), BP will complete the detailed inventory list of process chemicals or additives containing mercury, equipment containing mercury and process discharges that contain mercury

12. Within 36 months from the effective date of the permit modification to incorporate the SMV requirements (February 17, 2015), BP will develop a procedure utilizing a ranking method to identify the high-risk equipment and process chemicals for mercury exposure and alternatives that are feasible for their replacement. Then mercury containing chemicals and equipment will be replaced or substituted with chemicals or equipment containing less mercury or no mercury.

6.4 Spill Response and Reporting Requirement

Reporting requirements associated with the Spill Reporting, Containment, and Response requirements of 327 IAC 2-6.1 are included in Part II.B.2.(d), Part II.B.3.(c), and Part II.C.3. of the NPDES permit. Spills from the permitted facility meeting the definition of a spill under 327 IAC 2-6.1-4(15), the applicability requirements of 327 IAC 2-6.1-1, and the Reportable Spills requirements of 327 IAC 2-6.1-5 (other than those meeting an exclusion under 327 IAC 2-6.1-3 or the criteria outlined below) are subject to the Reporting Responsibilities of 327 IAC 2-6.1-7.

It should be noted that the reporting requirements of 327 IAC 2-6.1 do not apply to those discharges or exceedances that are under the jurisdiction of an applicable permit when the substance in question is covered by the permit and death or acute injury or illness to animals or humans does not occur. In order for a discharge or exceedance to be under the jurisdiction of this NPDES permit, the substance in question (a) must have been discharged in the normal course of operation from an outfall listed in this permit, and (b) must have been discharged from an outfall for which the permittee has authorization to discharge that substance.

6.5 Permit Processing/Public Comment

Pursuant to IC 13-15-5-1, IDEM will publish a general notice in the newspaper with the largest general circulation within the above county. A 30-day comment period is available in order to solicit input from interested parties, including the general public. Comments concerning the draft permit should be submitted in accordance with the procedure outlined in the enclosed public notice form.